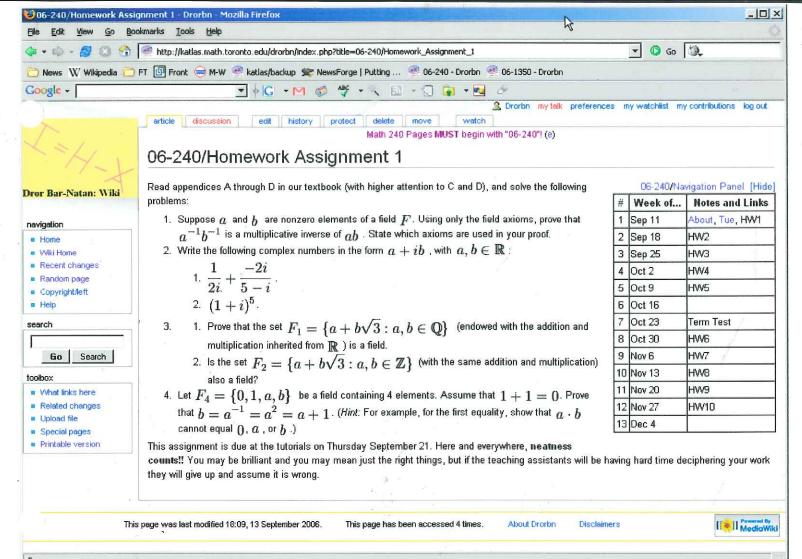
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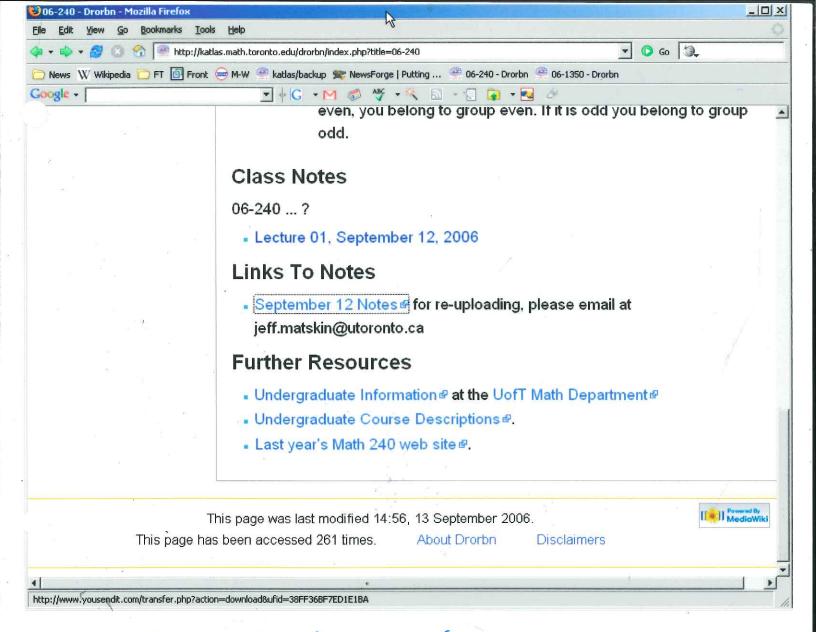
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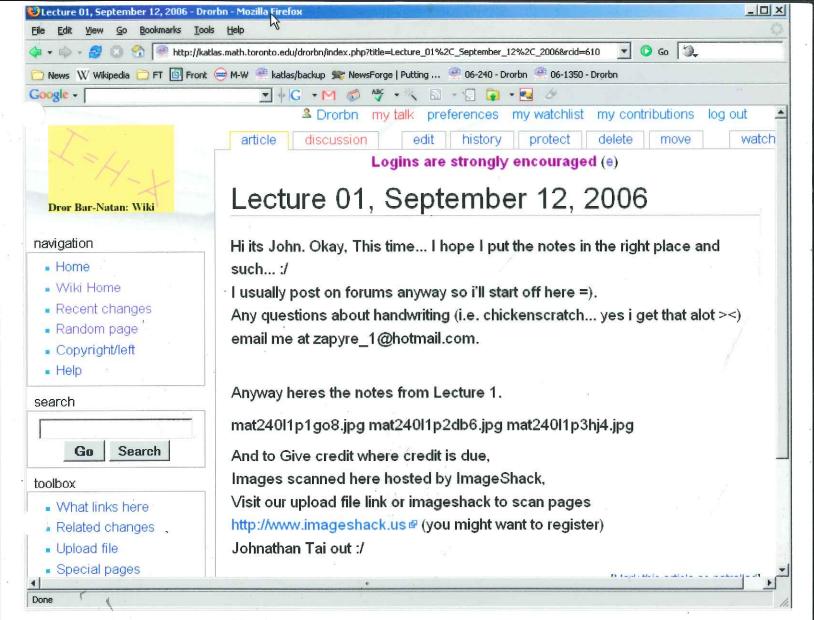


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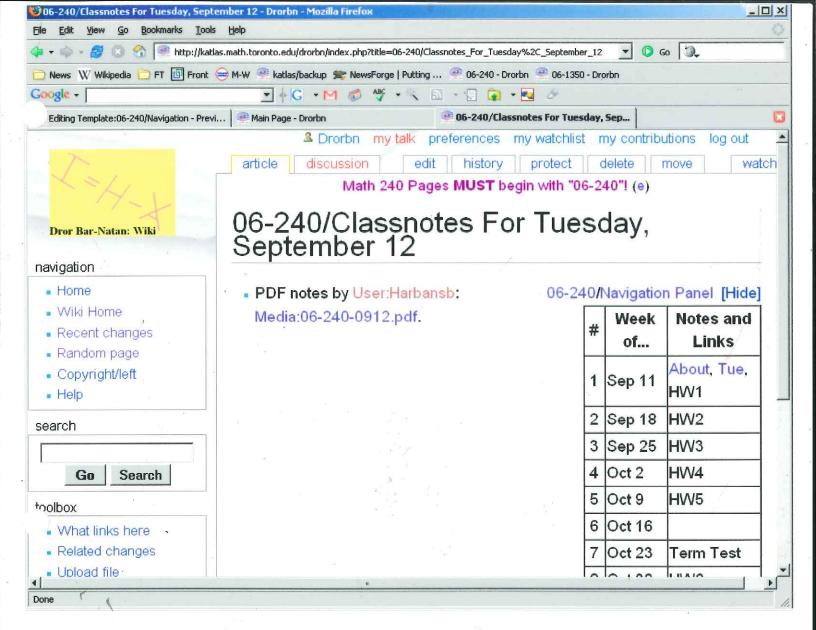


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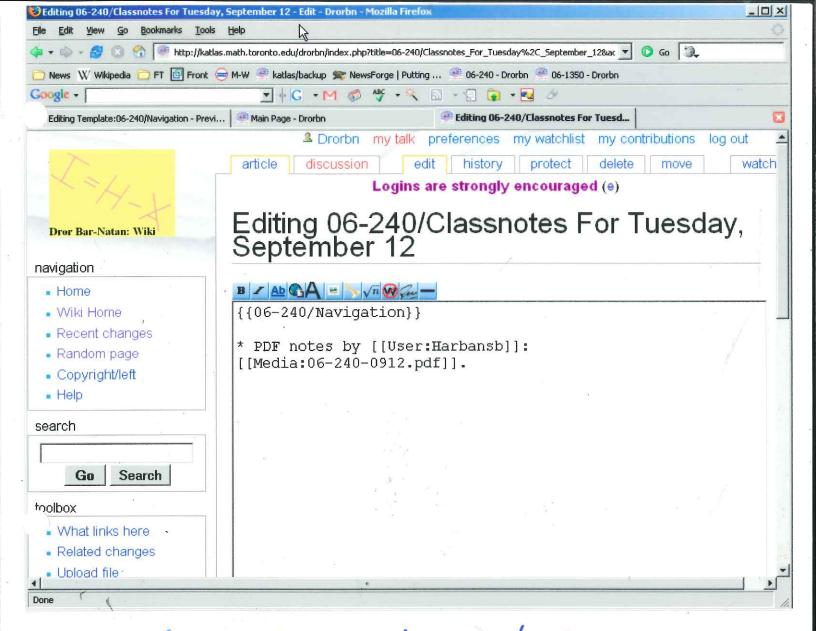


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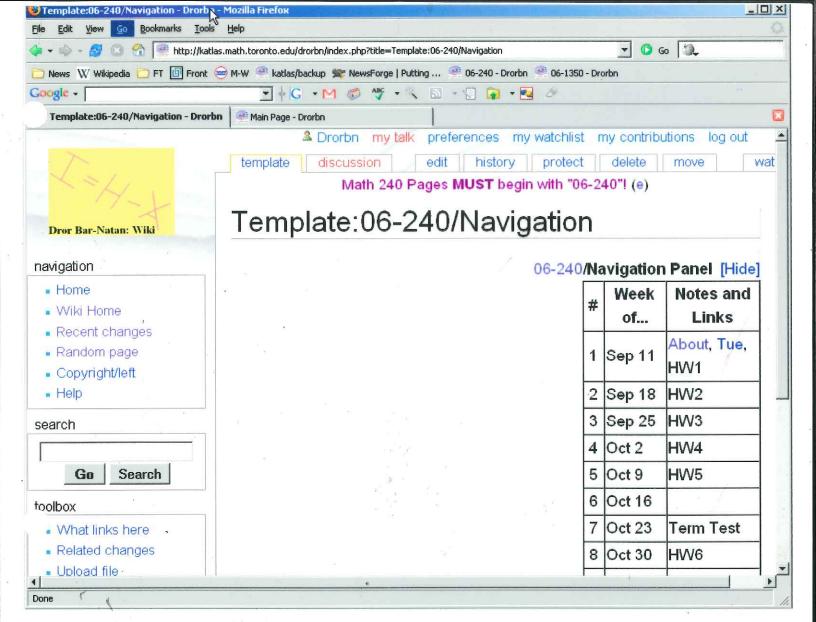
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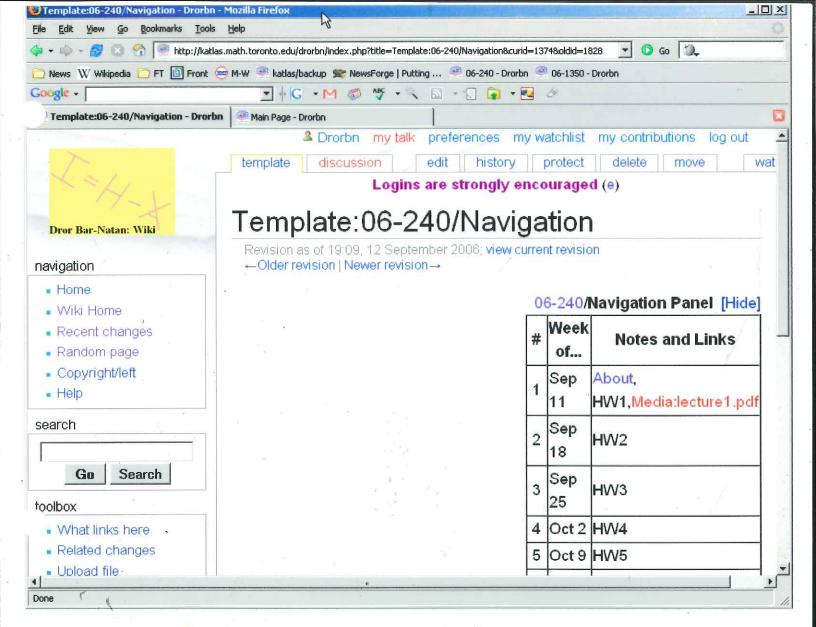
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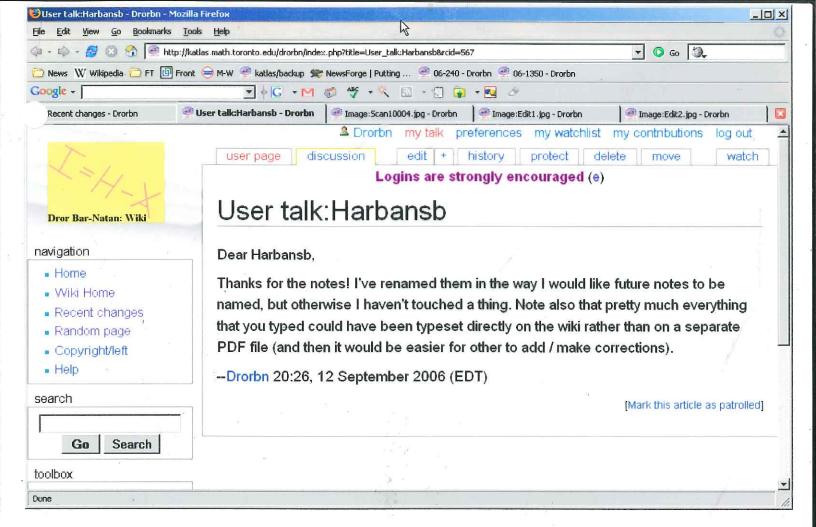
· Navigation inserted.
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The Navigation Panel
Should remain clean
and neat...



All page titles must Start with 06-240 ! Vse the wiki For typesetting?

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(a,6):-(a,7) (3+(0,1) ~ i (9,0) ~ a (9,5) = a+6i EAT IF 7-a4si, define "the conjugate of 2" to be Z:= a-D&bi (3+Zi)-3-7i The go ometrical picture Tatifon | Total multipliation. Claim Let nyl and x by integers, Then there are unique integer 9 (quotient) and r (remainder) St. X = nig + r and orran-1 Denote r= x mod n / The Field Zp. Example: 2/5. cont... Thu sep 21, hour 6.

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cont. I a motivation for vortor spaces X+y=y+X ASSOCI X+0=X $VSY \ \forall x \exists y \ x + y = 0$ $VSY \ \forall x \exists y \ x + y = 0$ $VSS \ 1 x = 5$ $VSS \ 0 (3x + y) = 0$ $VST \ 0 (3x + y) = 0$ $VST \ 0 (3x + y) = 0$ $VST \ 0 (3x + y) = 0$ Examples: 1. IFA 2. Mmrn (F) 3. AT T(S,F) On S a sof. 4. Polynomials. 5. C/R The Cancellation low The o is unique Thm negatives we uniffe Thm1. 0x=0 7. (-a) (=-ax = a/-x) 3 A 0=0.

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7.

06-240/Class Photo

দrom Drorbn

Our class on September 28, 2006:



Class Photo: click to enlarge

Please identify yourself in this photo! There are two ways to do that:

- Log in to this Wiki and edit this page. Put your name, userid, email address and location in the picture in the alphabetical list below.
- Send Dror an email message with this information.

The first option is more fun but less private.

Who We Are

First name	Last name	UserID	Email	In the photo	Comments	
Dror	Bar-Natan	Drorbn	drorbn@ math.toronto.edu	facing everybody, as the photographer	Take this entry as a model and leave it first. Otherwise alphabetize by last name. Feel free to leave some fields blank	
Mick	Carberry	MC	Mick.Carberry@utoronto.ca	long haired, bearded old guy in back	2	
Richard	Cerezo	Cerezo	richard.cerezo@utoronto.ca	Guy in black jacket and black hat on far right, second from the bottom.		

06-240/Navigation Panel [Hide]

#	Week of	Notes and Links
1	Sep 11	About, Tue, HW1, Putnam, Thu
2	Sep 18	Tue, HW2, Thu
3	Sep 25	Tue, HW3, Photo, Thu
4	Oct 2	HW4
5	Oct 9	HW5
6	Oct 16	
7	Oct 23	Term Test
8	Oct 30	HW6
9	Nov 6	HW7
10	Nov 13	HW8
11	Nov 20	HW9
12	Nov 27	HW10
13	Dec 4	

Register of Good Deeds



Add your name / see who's in!

*Class photo is online

Math 240 Algebra I, The Oct 3 2000, hows 10-11 Goal for mxt of weeks: Is 86415 divisible by 72 All vector spaces and the 'same 1. they correit workers

1. 'Same'?

2. So what?

3. So why bother with vector spaces o yes [use - in 2/17)

4. How is it proved [[2; =(*) form o]

basis* Fin on hould. Example In B(K), V=2x3-2x2+12x-6 is a linear combination of U,=X3-2x2-5x-3 and U=3x3-5x2-4x-9 Det SCV "generales" or "spins" V. Examples in M_{2} (R)= M_{1} = $\binom{10}{50}$ M_{2} = $\binom{01}{50}$ M_{3} = $\binom{00}{50}$ M_{4} = $\binom{00}{50}$ M_{5} = $\binom{01}{50}$ M_{7} = $\binom{01}{50}$ M_{8} = $\binom{01}{50}$ M_{9} = $\binom{01}{50}$ Then M,-My & N-Ny generate V, but M,-M3 (N,-15 A subject & is "linearly dependent" if it is "mosteful"

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Thouse & is "linearly independent". Examples deil, 2/3/8/19/1 ···/cont.

in the sign that I The Oct 2 200, now that Comments 1. \$ 15 lin. indep. 2. July is liminder IF wto, The sets, how 3 12 Suppose S, 55 CV a. if 5, is dep., 50 is & b. if S 15 indup., 50 15 51. 4. If S is lin indep in V, and VEV 15 not in 5. Then Sugris lin. Ly. iff. VESpon(,5). Duf Basis BCV examples 1. O For 906 2. li for FA 3 Eis for Mmm (F) 4. (1, x, ..., x) for Poff) 4. 41, x, x2, 3 for P(F) Thm A Subgt BEV is a basis 11-1every VEV on be expressed in a unique way as a lice of elements in B.

TABLE 1.1 Vitamin Content of 100 Grams of Certain Foods

	A	B_1	B_2	Niacin	C
	(units)	(mg)	(mg)	(mg)	(mg)
Apple butter	0	0.01	0.02	0.2	2
Raw, unpared apples (freshly harvested)	90	0.03	0.02	0.1	4
Chocolate-coated candy with coconut enter	0	0.02	0.07	0.2	0
Clams (meat only)	100	0.10	0.18	1.3	10
Cupcake from mix (dry form)	0	0.05	0.06	0.3	0
Cooked farina (unenriched)	$(0)^{a}$	0.01	0.01	0.1	(0)
Jams and preserves	10	0.01	0.03	0.2	2
Coconut custard pie (baked from mix)	0	0.02	0.02	0.4	0
Raw brown rice	(0)	0.34	0.05	4.7	(0)
Soy sauce	0	0.02	0.25	0.4	0
Cooked spaghetti (unenriched)	0	0.01	0.01	0.3	0
Raw wild rice	(0)	0.45	0.63	6.2	(0)

Source: Bernice K. Watt and Annabel L. Merrill, Composition of Foods (Agriculture Handbook Number 8), Consumer and Food Economics Research Division, U.S. Department of Agriculture, Washington, D.C., 1963.

^aZeros in parentheses indicate that the amount of a vitamin present is either none or too small to measure.

The vitamin content of 100 grams of each food can be recorded as a column vector in R⁵—for example, the vitamin vector for apple butter is

$$A = \begin{pmatrix} 0.00 \\ 0.01 \\ 0.02 \\ 0.20 \\ 0.20 \\ 0.20 \\ 0.40 \\ 0$$

Considering the vitamin vectors for cupcake, coconut custard pie, raw brown rice, soy sauce, and wild rice, we see that

$$\begin{array}{c} A \\ B_1 \\ B_2 \\ N \\ C \\ \end{array} \begin{array}{c} 0.00 \\ 0.05 \\ 0.06 \\ 0.30 \\ 0.00 \\ \end{array} \begin{array}{c} 0.00 \\ 0.02 \\ 0.40 \\ 0.00 \\ \end{array} \begin{array}{c} 0.00 \\ 0.34 \\ 0.05 \\ 4.70 \\ 0.00 \\ \end{array} \begin{array}{c} 0.00 \\ 0.02 \\ 0.25 \\ 0.40 \\ 0.00 \\ \end{array} \begin{array}{c} 0.00 \\ 0.45 \\ 0.63 \\ 6.20 \\ 0.00 \\ \end{array} \\ \begin{array}{c} 0.63 \\ 6.20 \\ 0.00 \\ \end{array} \begin{array}{c} 0.00 \\ 0.45 \\ 0.63 \\ \end{array} \begin{array}{c} 0.00 \\ 0.02 \\ 0.00 \\ \end{array} \begin{array}{c} 0.00 \\ 0.02 \\ 0.00 \\ \end{array} \begin{array}{c} 0.00 \\ 0.00 \\ 0.00 \\ \end{array}$$

Thus the vitamin vector for wild rice is a linear combination of the vitamin vectors for cupcake, coconut custard pie, raw brown rice, and soy sauce. So 100 grams of cupcake, 100 grams of coconut custard pie, 100 grams of raw brown rice, and 200 grams of soy sauce provide exactly the same amounts of the five vitamins as 100 grams of raw wild rice. Similarly, since

$$2 \begin{pmatrix} 0.00 \\ 0.01 \\ 0.02 \\ .20 \\ 2.00 \end{pmatrix} + \begin{pmatrix} 90.00 \\ 0.03 \\ 0.02 \\ 0.10 \\ 4.00 \end{pmatrix} + \begin{pmatrix} 0.00 \\ 0.02 \\ 0.07 \\ 0.20 \\ 0.00 \end{pmatrix} + \begin{pmatrix} 0.00 \\ 0.01 \\ 0.01 \\ 0.10 \\ 0.00 \end{pmatrix} + \begin{pmatrix} 10.00 \\ 0.01 \\ 0.03 \\ 0.20 \\ 2.00 \end{pmatrix} + \begin{pmatrix} 0.00 \\ 0.01 \\ 0.01 \\ 0.30 \\ 0.00 \end{pmatrix} = \begin{pmatrix} 100.00 \\ 0.10 \\ 0.18 \\ 1.30 \\ 10.00 \end{pmatrix}$$

The state of the state

200 grams of apple butter, 100 grams of apples, 100 grams of chocolate candy, 100 grams of faring, 100 grams of jam, and 100 grams of spaghotti provide



Wikipedia Image

HW: hage 34 /> pages Math 240 Algebra I, Thursday October 5 2006, hour 12.53-56 whenever lifes are distint, From list time. $M_i = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$ 87 d $\sum_{\alpha, u_i = 0} = \alpha, = 0.$ Comments: "no waste" $N_i = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$ band. The Mi's generate Mara 1. p is lin indep. M; = (N,+N2+N3+N4-3N1)/3 a, ful is lin indep iff uto. The Mi generale too 3. Suppose S, CSZ CV A; If S, is dy, So is S, b. If Sa is indep, so is S, A general Fact: IF To spans then span T = Spans "linear combs of linear combs
are linear combs" 4. If S is lin indep in T and VET is not ins, then survey is lindap iff Def A Gasis & = V Examples 1. \$ For doly 4. (x,...xn) For Poly 2. Leif for F? 5. 11, x, x2,) 3. E'N for Marn(F) For P(F). Thm A subset BCT is a basis iff every VET can be expressed in a unique way as a lic. of elements in B. I'm If a finite set & generals a V.S. V, Then Here is a subset BCS which is a basis of V

Moth 240 Algebra I, The Oct 10 2006, hours 13-14. Our First non-language theorem: The Through a Visit Whas a finite basis, then every other basis of I has the game of elements in it has a finite basis, we say it is finite-diminsonal? and let dism T = the number of climents In (any) basis of V immo The replacement lemma) finite set is generates V, 16=N, span G=V, the there is a subset Ber 1L=M, L lin indep | Which is a Gasis of The =), JHCG, 1H1=n-m, m<n& MHVL) = 7 Af of them frome langua of of lemma Thm Assume dim T=n a. If & Span L= V, Then 18/7/1 and it laten, then 6 15 A 505'S. b. If L is lin indep and /L)=n, the sa fasis C. Every lin. indep subset of V can be extended to a basis Thm V fid, WCV asabspace => W 15 fid. & Thm In this case, every basis of W can be extended to a basis of V. dim W Kdim V

	Math 240 Algebra I, Thu Oct 12 2006, hour 15
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	* Subspace of. Agant
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	* depends on the axion of choice? 2 Do it.
	* A basis for R over Q.
	that A Let Yiniff, n+1 be distinct pts in 18, Let y; i=1, n+1 by in 18.
	can you find a polynomial PEP(IR) st. P(II) = 4; }

Isomorphism

From Wikipedia, the free encyclopedia

For the term in sociology, see isomorphism (sociology).

In mathematics, an **isomorphism** (Grock: isos "equal", and morphe "shape") is a bijective map f such that both f and its inverse f^{-1} are homomorphisms, i.e. structure-preserving mappings.

Informally, an isomorphism is a kind of mapping between objects, which shows a relationship between two properties or operations. If there exists an isomorphism between two structures, we call the two structures isomorphic. In a certain sense, isomorphic sets are structurally identical, if you choose to ignore finer-grained differences that may arise from how they are defined.

According to Douglas Hofstadter:

"The word "isomorphism" applies when two complex structures can be mapped onto each other, in such a way that to each part of one structure there is a corresponding part in the other structure, where "corresponding" means that the two parts play similar roles in their respective structures." (Godel, Escher, Bach, p. 49)

Contents

- 1 Purpose
- 2 Physical analogies
- 3 Practical example
- 4 Abstract examples
 - 4.1 A relation-preserving isomorphism
 - 4.2 An operation-preserving isomorphism
- 5 Applications
- 6 See also
- 7 External links

Purpose

Isomorphisms are frequently used by mathematicians to save themselves work. If a good isomorphism can be found from a relatively unknown part of mathematics into some well studied division of mathematics, where many theorems are already proved, and many methods are already available to find answers, then the function can be used to map whole problems out of unfamiliar territory over to "solid ground" where the problem is easier to understand and work with.

Physical analogies

Here are some everyday examples of isomorphic structures:

■ A solid cube made of wood and a solid cube made of lead are both solid cubes; although their matter differs, their

http://en.wikipedia.org/w/index.php?title=Isomorphism&printable=yes

17/10/2006

Isomorphism - Wikipedia, the free encyclopedia

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 \sqsubseteq then an isomorphism from X to Y is a bijective function $f: X \to Y$ such that

$$f(u) \sqsubseteq f(v)$$
 if and only if $u \leq v$.

Such an isomorphism is called an order isomorphism

An operation-preserving isomorphism

Suppose that on these sets X and Y, there are two binary operations \star and Q which happen to constitute the groups (X,\star) and (Y,Q). Note that the operators operate on elements from the domain and range, respectively, of the "one-to-one" and "onto" function f. There is an isomorphism from X to Y if the bijective function $f: X \to Y$ happens to produce results, that sets up a correspondence between the operator \star and the operator Q.

$$f(u) \lozenge f(v) = f(u \star v)$$

for all u, v in X.

Applications

In abstract algebra, two basic isomorphisms are defined

- Group isomorphism, an isomorphism between groups
- Ring isomorphism, an isomorphism between rings. (Note that isomorphisms between fields are actually ring isomorphisms)

In Mathematical analysis, the Legendre transform maps hard differential equations into easier algebraic equations.

In universal algebra, one can provide a general definition of isomorphism that covers these and many other cases. For a more general definition, see category theory.

In graph theory, an isomorphism between two graphs G and H is a bijective map f from the vertices of G to the vertices of H that preserves the "edge structure" in the sense that there is an edge from vertex u to vertex v in G if and only if there is an edge from f(u) to f(v) in H. See graph isomorphism.

In linear algebra, an isomorphism can also be defined as a linear map between two vector spaces that is one-to-one and onto.

See also

- Automorphism
- Homomorphism ■ Epimorphism
- Isomorphism class
- Monomorphism
- Morphism

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geometric structures are isomorphic.

A standard deck of 52 playing cards with green backs and a standard deck of 52 playing cards with brown backs: although the colours on the backs of each deck differ, the decks are structurally isomorphic — if we wish to play

- cards, it doesn't matter which deck we choose to use.
 The Clock Tower in London (that contains Big Ben) and a wristwatch; although the clocks vary greatly in size, their mechanisms of reckoning time are isomorphic.
- A six-sided die and a bag from which a number 1 through 6 is chosen; although the method of obtaining a number is different, their random number generating abilities are isomorphic. This is an example of functional isomorphism, without the presumption of geometric isomorphism.

Practical example

The following are examples of isomorphisms from ordinary algebra

■ Consider the logarithm function: For any fixed base b, the logarithm function log_b maps from the positive real numbers R⁺ onto the real numbers R; formally:

$$\log_b : \mathbb{R}^+ \to \mathbb{R}$$

This mapping is one-to-one and onto, that is, it is a bijection from the domain to the codomain of the logarithm function. In addition to being an isomorphism of sets, the logarithm function also preserves certain operations. Specifically, consider the group (\mathbb{R}^+,\times) of positive real numbers under ordinary multiplication. The logarithm function obeys the following identity:

$$\log_b(x\times y) = \log_b(x) + \log_b(y)$$

But the real numbers under addition also form a group. So the logarithm function is in fact a group isomorphism from the group (\mathbb{R}^+,\times) to the group $(\mathbb{R}^+,+)$.

■ Consider the group Z₆: the numbers from 0 to 5 with addition modulo 6. Also consider the group Z₂ × Z₃, the ordered pairs where the x coordinates can be 0 or 1, and the y coordinates can be 0. 1, or 2, where addition in the x-coordinate is modulo 2 and addition in the y-coordinate is modulo 3. These structures are isomorphic under addition, if you identify them using the following scheme:

(0.0) > 0(1.1) > 1

(0,2) > 2

(1,0) > 3

(0.1) > 4

(1,2) -> 5

or in general $(a,b) > (3a+4b) \mod 6$. For example note that (1,1)+(1,0)=(0,1) which translates in the other system as 1+3=4. Even though these two sets "look" different, they are indeed **isomorphic**. More generally, the direct product of two cyclic groups \mathbf{Z}_n and \mathbf{Z}_m is cyclic if and only if n and m are coprime.

Abstract examples

A relation-preserving isomorphism

For example, if one object consists of a set X with an ordering \leq and the other object consists of a set Y with an ordering http://en.wikipedia.org/w/index.php?title=Isomorphism&printable=yes 17/10/2006

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- Isometr
- Metamorphic computer virus

External links

■ Weisstein, Eric W., Isomorphism (http://mathworld.wolfram.com/Isomorphism.html) at MathWorld

Retrieved from "http://en.wikipedia.org/wiki/Isomorphism"

Categories: Abstract algebra | Algebra | Category theory

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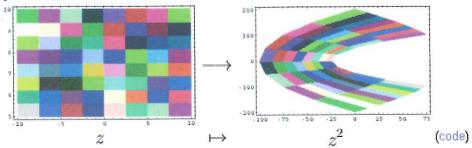
Contents [show]

06-240/Navigation Panel [Show]

Linear Algebra is the Small Scale Theory of Everything

edit

- To study the large, start with the small.
- In small scales, every space is a vector space.
 - Indeed if you walk a mile east, a mile north, a mile west and a mile south, you're back were you started, but if you fly a 1,000 miles east, a 1,000 miles north, a 1,000 miles west and a 1,000 miles south, you're not back were you started (where will you be?).
- In small scales, every function is a linear function.



- The world doesn't come with coordinates.
 - Hence whenever we can we work without a basis, and when we do study bases, we study all of them.

some Technical Remarks

edit

The Term Test

edit

Our one and only Term Test is coming up. It will take place in class on Tuesday October 24 2006, starting promptly at 1:10PM and ending at 3:00PM sharp. It will consist of 4-5 questions (each may have several parts) on everything that we will have covered in class by October 18: the axiomatic definition of fields and vector spaces, \mathbb{Z}/p and other examples, spans, linear combinations and linear equations, linear dependence and independence, bases, the replacement lemma and its consequences, a bit about linear transformations and a few smaller topics that we touched but don't deserve their own headers.

Note my comments from 06-240/Homework Assignment 5:

Will there be "proof questions"?

Sure. What else have we done so far?

Do we need to know the proofs from class?

Sure. There's a reason why these proofs are in class to start with; if they weren't valuable, we wouldn't have covered them.

Note also that there may be some computations, but nothing that will require a calculator. Note also that I may include some questions from the homework assignments verbatim or nearly verbatim.

No electronic devices capable of displaying text or sounding speech will be allowed.

Extra Class Time

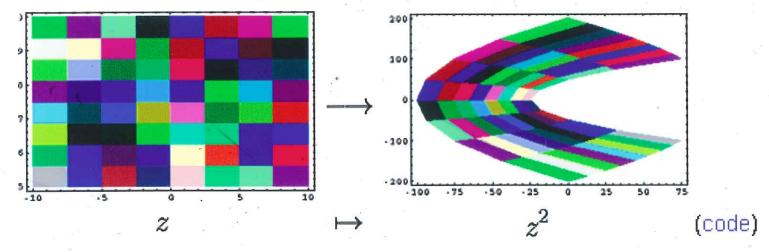
edit

On Thursday October we will have a 2-hour class (1-3PM) to make up for the class time lost on the Term Test, and just one hour of orials (3-4PM) as no HW assignment is due on that week anyway.

edit

Linear Algebra is the Small Scale Theory of Everything

- To study the large, start with the small.
- In small scales, every space is a vector space.
 - Indeed if you walk a mile east, a mile north, a mile west and a mile south, you're back were you started, but if you fly a 1,000 miles east, a 1,000 miles north, a 1,000 miles west and a 1,000 miles south, you're not back were you started (where will you be?).
- In small scales, every function is a linear function.



- The world doesn't come with coordinates.
 - Hence whenever we can we work without a basis, and when we do study bases, we study all of them.

ask to be kerrifled to go over hardart 15 minutes before ex. Moth 240 Algebra I, Tre Oct. 17 2006, hours 16-17 Linear Transformation. but first Fishy thm: Every Vis. has a basis. * 11,77,06 * Lagrange

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* nullity trank = dim or fa, az 93 14 } 1 glx Propaganda A Let I; 1=1. At be distinct its in 18 Lit y; i=1. n+1 be in 18 Q: Can you find a polynomial PEPn (B) St. P(x;)=y;? is it wayget ** Who cares? In computer drawing programs
2. scientists Let VXV be Vis. over the same 1 Field F. A function T:V->W is a lin trans Iff 1. T(0) > 0 2 T(X+y)=T(X)+T(y) 3 T(0) Among T is liner iff $\forall G, x, y \in T(x, y)$.

Silly claims T(x-y) = T(x) - T(y). T(Za;xi)=Za; Tbc;) Examples 1. T((a1)) (39, a2) T:182 > 182 thu oct (819 3. Tolleto = Counter clock wise how 18. Theorem If (di)/15 a basis of V and WiFW, 51-12 COM 240 Ale ba I To at I 2006/10) CITA $T(\alpha_i) = \omega_i$ That Dut V & W TR "Isomorphic" if... The Any two vector spices of dim n are isomorphic In proticular, all are isomorphic to For. null Space/Kornel The These are sinds The DOE nulity This nullity trank = din

18 50 mlt

*Return TT at end. Math 240 Algebra I, thu oct 26 200, hours 19-20 Plan IAll you can say about line trans without fixing a basis, Recall T.V->W is lin trans if T(0)=0 T(x+y)=T(x)+T(y) T(x-y)=-t(x-y) T(x-y)=-t(x-y)T(cx) = cT(x) clain A T(cx+y) = cT(x) + T(y)2. IV. V->V. Def N(T)= ko/T R(T)=Im(T) Prop N(T) = / is a subspace; dim N(T)=: nullity(T) R(T) CW is a subspace. Jim R(+)=: rank(+) |-| Examples O, IV, D: Pn (IR) - MPn (IR) X. Thm I nulity (TI+ rank (+) = sim(v) (the dim therein) ento, Thm2 Given T: V->W and T!V'->W' invertible S.t. (Jim V, Jim W, rank T) = (Jim V, Jim W, rand T),

There is a commutative square of isomorphisms Skipallo Cort of flm 1 IF Jim V = Jim W 2. Tisonto 3. rank T=dim(V) 4. T is invertible. roo/conti

Contend 240 Alaba 1 the of 36 200 years Let B= (U, ... Un) be an ordered basis of a f.d. V.S. V. If >1 = Zajuj, write The coords of x = (a, b) (a, b) (a, b) (a, b) (a, b)Example $[X^2-2X+3]_{(1,X,X^2)}=\begin{bmatrix} 3\\ -2 \end{bmatrix}$ Det Given TiV-TW a lin transa and orderes bases & (V, Va) of V & 8=(W, Wm) of W, A=[T]= (Fy) [Ty] [Ty] (MM) (F) Note 1. I can be preconstructed from ITT's 2. Every matrix rrises in this way. examples 200: D: B3 (1R) -7B1R) by differentiation. dain 1. L(V, W) 15 a V.S. 2. THOLTJE US An somorphism of DL/V, W/-)Nmxn/F)

Mith 240 Algebra I, The Oct 31 2006, hours 21-22 bases & matrices as planned for lost time, Composition & matrix pultiplication. hold U BY C = AB

Cki = Aks Bil W=TV [V]=V [W]=W [T]=A

Mith 240 Algebra I, The Nov 7 2006 how's 24-25 The bad mus about matrix algebra Y=(ui) =1 BEMAR B=(y)? ACM mm = (m)m 1. A'B defined only when dims mitch. 2. At may not exist was IF AFO. A=[T] = (axi) TV = SaxiWk $C = \left[T \circ S\right]_{x}^{y} = A \cdot B = \left(C_{ki}\right) \in M_{mkl}$ $C_{ki} = \sum_{j=1}^{n} a_{kj} b_{ji} \left(A\right) \left(A\right)$ 3. Generally AB+BA. Today Goals: 1. The good news about matrix alguments and interly de. W=TV [V]B=V [W]=W [T] =A The good news about matrix algebra:

1. A+B=B+A (A+B)+CD-A+(B+C), ... (addition)

The good news about matrix algebra:

1. A+B=B+A (A+B)+CD-A+(B+C), ... (addition) 2. A. (B.C)= AB)C, AI=A, JA=A, IF A.A = I then A A = I 3 A+B)C=AC+BC AD(B+C)=ABTAC Computation 1. compute rank & T/A

2. compute A' (when possible)

3. Solve systems of lin. en/as Thm If P.Q are in Vortible, rank PTQ = ankT elementary matrices & RW of Des 3. interchanges a sider server. 3 add as so of a mod.

Example compite the link of Mrs. Alm

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Logins are strongly encouraged (e)

Talk: 06-240/Classnotes For Thursday November 9

< Talk:06-240

Does anyone have an intuitive way of understanding matrix multiplication? Specifically, why we take a column of B and a row of A for AxB? There are a few helpful indications of how this can be interpreted (in terms of linear transformations), but I was wondering if anyone had found a stronger (i.e. more natural/intuitive) way of justifying it to themselves. --Wanmike 13:44, 8 November 2006 (EST)

06-240/Classnotes For Thursday November 9

From Drorbn

Review of Last Class

06-240/Navigation Panel [Show]

Problem. Find the rank (the dimension of the image) of a linear transformation T whose matrix representation is the matrix A shown on the right.

$$A = \begin{pmatrix} 0 & 2 & 4 & 2 & 2 \\ 4 & 4 & 4 & 8 & 0 \\ 8 & 2 & 0 & 10 & 2 \\ 6 & 3 & 2 & 9 & 1 \end{pmatrix}$$

Theorem 1. If $T:V\to W$ is a linear transformation and $P:V\to V$ and $Q:W\to W$ are invertible linear transformations, then the rank of T is the same as the rank of QTP.

Proof. Owed.

Theorem 2. The following row/column operations can be applied to a matrix A by multiplying it on the left/right (respectively) by certain *invertible* "elementary matrices":

- 1. Swap two rows/columns
- 2. Multiply a row/column by a scalar.
- 3. Add a multiple of one row/column to another row/column.

Proof.

Semi-owed.

Solution of the problem. using these (invertible!) row/column operations we aim to bring A to look as close as possible to an identity matrix, hoping it will be easy to determine the rank of the matrix we get at the end:

	*	E 20 40	
Do	Get	Do	Get
1. Bring a 1 to the upper left corner by swapping the first two rows and multiplying the first row (after the swap) by 1/4.	$\begin{pmatrix} 1 & 1 & 1 & 2 & 0 \\ 0 & 2 & 4 & 2 & 2 \\ 8 & 2 & 0 & 10 & 2 \\ 6 & 3 & 2 & 9 & 1 \end{pmatrix}$	2. Add (-8) times the first row to the third row, in order to cancel the 8 in position 3-1.	$\begin{pmatrix} 1 & 1 & 1 & 2 & 0 \\ 0 & 2 & 4 & 2 & 2 \\ 0 & -6 & -8 & -6 & 2 \\ 6 & 3 & 2 & 9 & 1 \end{pmatrix}$
3. Likewise add (-6) times the first row to the fourth row, in order to cancel the 6 in position 4-1.	$ \begin{pmatrix} 1 & 1 & 1 & 2 & 0 \\ 0 & 2 & 4 & 2 & 2 \\ 0 & -6 & -8 & -6 & 2 \\ 0 & -3 & -4 & -3 & 1 \end{pmatrix} $	4. With similar column operations (you need three of those) cancel all the entries in the first row (except, of course, the first, which is used in the canceling).	$ \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 2 & 4 & 2 & 2 \\ 0 & -6 & -8 & -6 & 2 \\ 0 & -3 & -4 & -3 & 1 \end{pmatrix} $
5. Turn the 2-2 entry to a 1 by multiplying the second row by 1/2.	$ \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 2 & 1 & 1 \\ 0 & -6 & -8 & -6 & 2 \\ 0 & -3 & -4 & -3 & 1 \end{pmatrix} $	6. Using two row operations "clean" the second column; that is, cancel all entries in it other than the "pivot" 1 at position 2-2.	$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 2 & 1 & 1 \\ 0 & 0 & 4 & 0 & 8 \\ 0 & 0 & 2 & 0 & 4 \end{pmatrix}$
7. Using three column operations clean the second row except the pivot.	$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 4 & 0 & 8 \\ 0 & 0 & 2 & 0 & 4 \end{pmatrix}$	8. Clean up the row and the column of the 4 in position 3-3 by first multiplying the third row by $1/4$ and then performing the appropriate row and column transformations. Notice that by pure luck, the 4 at position 4-5 of the matrix gets killed in action.	$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

But the matrix we now have represents a linear transformation S satisfying $S(v_1, v_2, v_3, v_4 v_5) = (w_1, w_2, w_3, 0, 0)$ for some bases $(v_i)_{i=1}^5$ of V and $(w_j)_{j=1}^4$ of W. Thus the image (range) of S is spanned by $\{w_1, w_2, w_3\}$, and as these are independent, they form a basis of the image. Thus the rank of S is 3. Going backward through the "matrix reduction" process above and repeatedly using theorems 1 and 2, we find that the rank of T must also be 3.

North 240 Algebra I, Thy Nov 9 2006, hour 26 * Go over "interpretation" question by Wannike Vover "review of last dess" handout.

Moth 240 Algebra I: The lost 4 Weeks, Fall 2006
Week 10: More about computations: Invating matrices, Solving systems of lin, agais, row wholen from
Week 11: A very quick intro. to determinants.
Week 12: A very quick into to diagram litation.
Week 13: regerse

5. How for anyon go with row ofs. 2. or difficult principle on loan

6, invoiting matrices. 3. An easy theorem & Thyouting

Math 240 Algebra I, the Nov H 2006, how's 27-28. Lemma IF P &Q are invarlible, PART= rank PT = rank TQ = rank PTQ principle (to be revisited later) changing a 695/5")5"

multiplication by an invadible matrix

(hance rank A is will defined for a prior i grands The Every matrix A can be routedown reduced to a block matrix of the form (I) (So ranks (Can always) Claim rank A = rank AT claim rank A = dim (col-spape A) & dim (row-space(A) Q: How far can you go with row ops only?
Ans: To 'reduced row echelon form' dante If B is in reduct you whelen form, ant B= Sappose A is non invertible & B 15 a pref milix row-equivalent to A. Then B is I. => An algorithm for matrix inversion. The side. = 7E,E,E,A = ØI

Example Invert

The Lost Sequence

I was playing around with sequences, and I thought I would screw around with the Shaw-Basho Polynomial:

$$\frac{1}{120} \left(42x^5 - 305x^4 + 1100x^3 - 895x^2 + 1018x + 480 \right)$$

I plugged 0 into the polyomial to get 4, and then I plugged in 1 to get 12, etc. I got the following infinite sequence of numbers:

4 12 35 89 213 511 1194 2622 5346 10150 18093 ... (goes on forever)

Not too interesting, eh? Then I wrote out the differences of succeeding numbers in the sequence. For example, 12 - 4 = 8, 35 - 12 = 23/89 - 35 = 54, etc.

8 23 54 124 298 683 1428 2624 4804 7943 ... (goes on forever)

I kept doing this process. The third sequence began 23 - 8 = 15, 54 - 23 = 31, etc. When you keep going, something completely unexpected happens! Here - I've done the work for you:

SEQUENCE 1: 4 12 35 89 213 511 1194 2622 5346 10150 18093 ... (goes on forever)

SEQUENCE 2: 8 23 54 124 298 683 1428 2624 4804 7943 12458... (goes on forever)

SEQUENCE 3: 15 31 70 174 385 745 1296 2080 3139 4515 6250... (goes on forever)

SEQUENCE 4: 16 39 104 211 360 551 784 1059 1376 1735 ... (goes on forever)

SEQUENCE 5: 23 65 107 149 191 233 275 317 359 ... (goes on forever)

SEQUENCE 6: 42 42 42 42 42 42 42 42 42 ... (goes on forever)

SEQUENCE 7: 0 0 0 0 0 0 (goes on forever)

SEQUENCE 8: 0 0 0 0 0 0 0 (goes on forever)

SEQUENCE 9: 0 0 0 0 0 0 0 (goes on forever)

SEQUENCE 10: 0 0 0 0 0 0 0 (goes on forever)

And it stays at zero forever. The sequence destroys itself.

NOW: Look at the first element of each sequence, and you have the LOST numbers. Weird, eh?



Lost Lost

Aguida 80 1. Lin gris & matria. Mith 240 Algebra I, Thu Nov 16 82006, hour 29. Whatever (xy)=1/1 2x-7y=-3 -3x+2y=-4a, x, + a, 2 x2+... a, 1 x, = b, => Ax=6 an IX f. . + ann xn = bn "inhomogeneous lin. egn." O. If we saw lucky & A is square "homog" lin Al & invortible, b = A'x, often we are looking, but Often we are not homog case of solutions the becarte 1. O. 15 dway a sol. 21 X a solf IF XE null-spree A. non-hornog case 1. Soln iff bEranA = col-spraA 2. If to solves then I, solves Iff X1 = X0 + X where & Solves
the homog Version. Solving Ax= b & EAX= E6

Talk:06-240/Classnotes For Tuesday November 14

< Talk:06-240

Reduced row echelon form - Is there a reason to make column with entry 1 to the form of e_n (1 at n^{th} row, 0 for all other entries)? According to some books, matrix

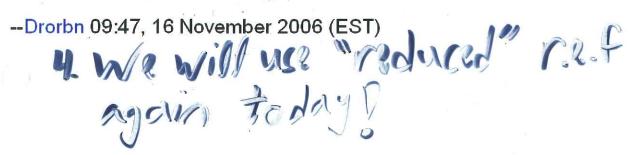
$$\begin{pmatrix} 1 & 3 & 2 & 4 & 2 \\ 0 & 1 & 2 & 3 & 4 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$
 is good enough to show that the rank of the matrix is 3. This is

because the first three rows are linearly independent, they can't form linear combination for preceeding rows. Anyone could please explain why we have to reduce

* to
$$\begin{pmatrix} 1 & 0 & -4 & 0 & -2 \\ 0 & 1 & 2 & 0 & -2 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$
? Thank you. Wongpak 23:54, 15 November 2006 (EST)

Answer. For the purpose of figuring out the rank of a matrix, indeed there is no reason to go to "reduced row echelon form", and the slightly easier "row echelon form" (as in your first matrix above) is sufficient. But

- 1. "Row echelon form" doesn't enjoy the nicer characterization as "the most you can do with row reduction".
- 2. It is possible to prove (though most likely we won't) that the reduced row echelon form of a matrix is unique, while the row echelon form certainly isn't.
- 3. We did use the fact that we could get via row operation to the reduced row echelon form in our algorithm for matrix inversion.



Math 240 Algebra I, Tue Nov 21 2006, hours 30-31 1. Go over Wongpak Matrices handout. 2. A Hodet A FIAI EDF 1. Vsefulness 1. Thm A exists & 7 del 4 to.
2. Formula
3. "axiomatic" properties Examples | a5 | = ad - 60 | \begin{aligned} \begin{align 3. "Axiomatic" Proporties: Thm I det I = 1 2. det is "multilinear" in the wows" 3. If A has two equal adjacent rows, det A=0. The All there is to know about determinate can be lurned from these three properties!

If Jet has some props, Jet = Jet! Proposition: 1. det (EisA)=Jet A ; det Eis=-1 2. Let Eich-Chet A; det Eic = C (also forc=o) 3. Let E3, A = 6 Let A; Let E3 = 1 -- lother side.

Tool in the continue of the co Example Compute Proof of proposition Proof of the axiomstic props

06-240/Classnotes For Tuesday November 21

From Drorbn

More about the Wongpak Matrices

06-240/Navigation Panel [Show]

In Talk:06-240/Classnotes_For_Tuesday_November_14, User:Wongpak asked something about row echelon form and reduced row echelon form, and gave the following matrices as specific examples:

$$A_{1} = \begin{pmatrix} 1 & 3 & 2 & 4 & 2 \\ 0 & 1 & 2 & 3 & 4 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \qquad A_{2} = \begin{pmatrix} 1 & 0 & -4 & 0 & -6 \\ 0 & 1 & 2 & 0 & -2 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

So let us assume row reduction leads us to the systems $A_1x=b$ or $A_2x=b$. What does it tell us about the solutions? Let us start from the second system:

$$\begin{pmatrix} 1 & 0 & -4 & 0 & -6 \\ 0 & 1 & 2 & 0 & -2 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{pmatrix} \qquad \text{or} \qquad \begin{array}{c} x_1 & -4x_3 & -6x_5 = b_1 \\ x_2 + 2x_3 & -2x_5 = b_2 \\ x_4 + 2x_5 = b_3 \\ 0 & = b_4 \end{array}$$

Well, quite clearly if $b_4 \neq 0$ this system has no solutions, but if $b_4 = 0$ it has solutions no matter what b_1 , b_2 and b_3 are. Finally, for any given values of b_1 , b_2 and b_3 we can choose the values of x_3 and x_5 (the variables corresponding the columns containing no pivots) as we please, and then get solutions by setting the "pivotal variables" in terms of the non-pivotal ones as follows: $x_1 = b_1 + 4x_3 + 6x_5$, $x_2 = b_2 - 2x_3 + 2x_5$ and $x_4 = b_3 - 2x_5$.

What about the system corresponding to A_1 ? It is

$$\begin{pmatrix} 1 & 3 & 2 & 4 & 2 \\ 0 & 1 & 2 & 3 & 4 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{pmatrix} \qquad \text{or} \qquad \begin{array}{c} x_1 + 3x_2 + 2x_3 + 4x_4 + 2x_5 = b_1 \\ x_2 + 2x_3 + 3x_4 + 4x_5 = b_2 \\ x_4 + 2x_5 = b_3 \\ 0 = b_4 \end{array}$$

Here too we have solutions iff $b_4 = 0$, and if $b_4 = 0$, we have the freedom to choose the non-pivotal variables x_3 and x_5 as we please. But now the formulas for fixing the pivotal variables x_1 , x_2 and x_4 in terms of the non-pivotal ones are a bit harder.

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■ This page was last modified 21:17, 20 November 2006.

Moth 240 Algebra I, Thu Nov 23 2006, hour 32.
'A xiomatic' properties of Let First: 1. Let I = 1 IA = E = 1) IA 1. Let I = 1 IA = E = 1) IA IA
2. det 15 'mattiliner in the rows'
3. If A has two equal adjacent rows, det A=6
Thin 2 A is invertible = [A (15 invertible] Through det is fully computable asing row operations.
Proof of the props
More properties: Let (AB) jet (AT) jet AT j Volume.

Moth 240 Algebra I, The Nov 28 2006, hows 33-34 Today's agenda: Alverdy know! Dets 1. det AB = det (A) det B) JE IS chroplary, Jet(EA) = (Jet E) (Jet A) Dolts 2. det (A-1) = (det A)-1 3. Let AT & columns 4. Volumes in a word. Not: The proproductive biology of 1564/5. Annaying and Apor Bost invertible Proof of 1 Interesting case A-EAEZ. EAT B= EBEB ... EB I - - -PFDF2 PF of y Just the state & example: The forms is For rowsis (8,5) Problem Given T, compute 7365
"knowing tenorrow in terms of today,
Compute a year about". Example 1 compute (20)365, (89)35 Example 2 The reproductive biology of rahits Actually do 1 & 2 &

Math 240 Algebra I, Thu Nov 30 2006 how 35 1 * August about complexity & determinants (+ magazing) 2 * Fingsh an o cigval/vcc example 3. + Change of Gasis 48 (89)365 (01) , Fiboracci (next time) More on 3

IR BB

A SARM "A committee diagram"

LIJBIQ A SIRM

A SIRM AU = XVE A-XI)V = 0 (3) det(A-XI) = 0 $\left(\begin{pmatrix} 8 & 9 \\ -6 & 7 \end{pmatrix} - 2I\right)V_1 - 0 = 7 \begin{pmatrix} 6 & 9 \\ -6 & -9 \end{pmatrix}V_1 - 0 = 7 V_1 \times \begin{pmatrix} 3 \\ -2 \end{pmatrix}$

06-240/Classnotes For Tuesday December 5

Our remaining goal for this semester is to study the 06-240/Navigation Panel [Show] following theorem:

Theorem. Let A be an $n \times n$ matrix (with entries in some field F) and let $\chi_A(\lambda) := \det(A - \lambda I)$ be the characteristic polynomial of A. Assume χ_A has n distinct roots $\lambda_1 \dots \lambda_n$, that is, A has n distinct eigenvalues $\lambda_1 \dots \lambda_n$, and let v_1, \dots, v_n be corresponding eigenvectors, so that $Av_i = \lambda_i v_i$ for all $1 \le i \le n$. Let D be the diagonal matrix that has λ_1 through λ_n on its main diagonal (in order) and let P be the matrix whose columns are these eigenvectors: $P := (v_1|v_2|\cdots|v_n)$. Then P is invertible and the following equalities hold:

1.
$$D = P^{-1}AP$$
 and $A = PDP^{-1}$.

2. For any positive integer k we have $A^k = PD^kP^{-1}$ and

$$D^k = \begin{pmatrix} \lambda_1^k & 0 \\ & \ddots & \\ 0 & & \lambda_n^k \end{pmatrix}$$

3. Likewise if
$$F=\mathbb{R}$$
 and $\exp(B):=\sum_{k=0}^{\infty} \frac{B^k}{k!}$ then

$$\exp(A) = P \exp(D) P^{-1} \text{ and } \exp(D) = \begin{pmatrix} e^{\lambda_1} & 0 \\ & \ddots & \\ 0 & & e^{\lambda_n} \end{pmatrix}.$$

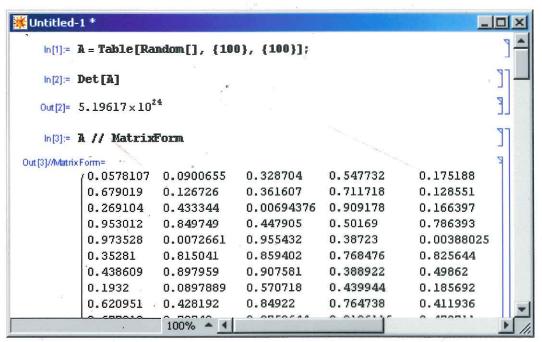
Order of the proceedings.

- 1. Assuming P is invertible, a proof of 1.
- 2. Proof of 2.
- 3. Example the "reproduction of rabbits" matrix $A=\begin{pmatrix} 0&1\\1&1 \end{pmatrix}$ (see the mathematica session below).
- 4. Discussion of 3.
- 5. The relationship with linear transformations and changes of basis.
- 6. v_1 thorough v_n form a basis and P is invertible.

$\ln[1] = \left\{ A = \begin{pmatrix} 0 & 1 \\ 1 & 1 \end{pmatrix}; \quad \chi = \text{Det} \left[A - \lambda \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right], \quad \{\lambda_1, \lambda_2\} = \lambda /. \quad \text{Solve} \left[\chi = 0, \lambda \right] \right\}$ Out[1]= $\left\{-1 - \lambda + \lambda^2, \left\{\frac{1}{2} \left(1 - \sqrt{5}\right), \frac{1}{2} \left(1 + \sqrt{5}\right)\right\}\right\}$ $\ln[2] = \left\{ \text{Simplify} \left[A - \lambda_1 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right] // \text{ MatrixForm, } v_1 = \text{First} \left[\text{NullSpace} \left[A - \lambda_1 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right] \right] \right\}$ Out[2]= $\left\{ \begin{pmatrix} \frac{1}{2} \left(-1 + \sqrt{5}\right) & 1 \\ 1 & \frac{1}{2} \left(1 + \sqrt{5}\right) \end{pmatrix}, \left\{ \frac{1}{2} \left(-1 - \sqrt{5}\right), 1 \right\} \right\}$ $\ln[3] = \left\{ \text{Simplify} \left[A - \lambda_2 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right] / / \text{ MatrixForm, } v_2 = \text{First} \left[\text{NullSpace} \left[A - \lambda_2 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right] \right] \right\}$ Out[3]= $\left\{ \begin{pmatrix} \frac{1}{2} \left(-1 - \sqrt{5}\right) & 1 \\ 1 & \frac{1}{2} \left(1 - \sqrt{5}\right) \end{pmatrix}, \left\{ \frac{1}{2} \left(-1 + \sqrt{5}\right), 1 \right\} \right\}$ $ln[4] = MatrixForm /@ {P = Transpose[{v₁, v₂}], Inverse[P], Simplify[P.Inverse[P]]}$ Out[4]= $\left\{ \begin{pmatrix} \frac{1}{2} \left(-1 - \sqrt{5} \right) & \frac{1}{2} \left(-1 + \sqrt{5} \right) \\ 1 & 1 \end{pmatrix}, \begin{pmatrix} -\frac{1}{\sqrt{5}} & -\frac{1-\sqrt{5}}{2\sqrt{5}} \\ \frac{1}{\sqrt{5}} & -\frac{-1-\sqrt{5}}{2\sqrt{5}} \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right\}$ ln[5]:= MatrixForm /@ {B = Simplify [Inverse [P] . A.P], Bn = Simplify [B^n, n > 0]} Out[5]= $\left\{ \begin{pmatrix} \frac{1}{2} \left(1 - \sqrt{5}\right) & 0 \\ 0 & \frac{1}{2} \left(1 + \sqrt{5}\right) \end{pmatrix}, \begin{pmatrix} \left(\frac{1}{2} \left(1 - \sqrt{5}\right)\right)^{n} & 0 \\ 0 & \left(\frac{1}{2} \left(1 + \sqrt{5}\right)\right)^{n} \end{pmatrix} \right\}$ In[6]:= (An = Simplify[P.Bn.Inverse[P]]) // MatrixForm $\frac{1}{5} 2^{-1-n} \left(-\left(-5+\sqrt{5}\right) \left(1+\sqrt{5}\right)^n + \left(1-\sqrt{5}\right)^n \left(5+\sqrt{5}\right)\right) \frac{2^{-n} \left(-\left(1-\sqrt{5}\right)^n + \left(1+\sqrt{5}\right)^n\right)}{\sqrt{5}}$ $\frac{-\left(\frac{1}{2}\left(1-\sqrt{5}\right)\right)^{n}+\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^{n}}{\sqrt{5}}$ $\frac{1}{5} 2^{-1-n} \left(-\left(1-\sqrt{5}\right)^n \left(-5+\sqrt{5}\right)+\left(1-\sqrt{5}\right)^n\right)$ $ln[7] = Simplify[An /. n \rightarrow 7] // MatrixForm$

Just for fun. A certain 100×100 matrix A of random numbers between 0 and 1 is fed into a computer called Golem, capable of about 10^9 arithmetic operations per second (between floating point numbers, at roughly 14 decimal digits of precision).

- Estimate how long it will take Golem to compute det A using the explicit recursive formula.
- As you may know, glass is really a liquid and it slowly flows with gravity. How
 many times will you need to replace your computer screen before the
 computation is done?
- Assuming you are ready to wait and shuffle screens, will you trust the results?
 (Remember that even if electrical power will be available to eternity and electronic components will never fail, every time a computer adds or multiplies two 14-digit numbers it makes a rounding error of size around 10⁻¹⁴).
- Estimate how long it will take Golem to compute $\det A$ using row operations.
- Assuming you are ready to wait, will you trust the results (remembering the same comment as above)? How many screens will you go through this time?



Computed on Dror's laptop in a fraction of a second. The matrix is cropped, of course.

06-240/On The Final Exam

From Drorbn

Our final exam is coming up. It will take place at BN3 - room 3 of the Clara Benson

06-240/Navigation Panel [Show]

Building, 320 Huron Street (south west of Harbord cross Huron, home of the Faculty of

Physical Education and Health) on Wednesday December 13 from 2PM until 5PM. It will consist of 5-6 questions (each
may have several parts) on everything that we will have covered in class this semester:

- Fields and vector spaces.
- Spans, independence, replacement and bases.
- Linear transformation, rank, nullity, matrices.
- Row and column reduction and elementary matrices, systems of linear equations.
- Determinants.
- Change of basis and diagonalization.
- Several other "smaller" topics.

As for the style -

- You can expect to be asked to reproduce some proofs that were given in class.
- You can expect some fresh things to prove, though generally not as hard as the previous type of proofs.
- You can expect questions (or parts of questions) that will be identical or nearly identical to questions that were assigned for homework.
- You can expect some calculations (but nothing that will require a calculator).

Basic calculators (not capable of displaying text or sounding speech) will be allowed but will not be necessary. You may wish to bring one nevertheless, as under pressure 5 + 7 often comes out to be 13.

Remember. Neatness counts! Organization counts! Language counts! Proofs are best given as short and readable essays; without the English between the formulas one never knows how to interpret those formulas. When you write, say, " $v \in V$ ", does it mean "choose $v \in V$ ", or "we've just proven that $v \in V$ ", or "assume by contradiction that $v \in V$ ", or "for every $v \in V$ " or "there exists $v \in V$ "? If you don't say, your reader has no way of knowing. Also remember that long and roundabout solutions of simple problems, full of detours and irrelevant facts, are often an indication that their author didn't quite get the point, even if they are entirely correct. Avoid those!

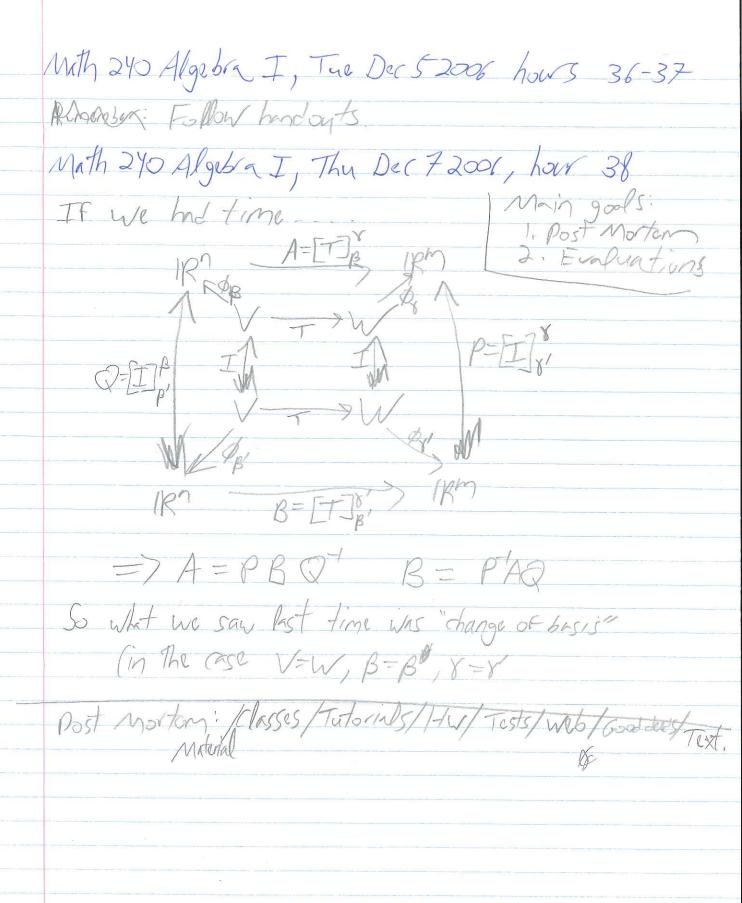
Office hours. I (Dror) will hold two sessions of extended office hours at or near my office (Bahen 6178) before the final:

- On Tuesday December 12th (the day before), 1-4PM.
- On Wednesday December 13th (the day of), 10-12, just for last minute questions.

I would have loved to give more, but long before the final was scheduled I was asked to organize a session in a Canadian Mathematical Society conference on Saturday through Monday right before our exam. So unfortunately I will be completely unreachable on these three days.

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UNIVERSITY OF TORONTO

Faculty of Arts and Sciences DECEMBER EXAMINATIONS 2006 Math 240H1 Algebra I — Final Exam

Dror Bar-Natan December 13, 2006

Solve all of the following 5 questions. The questions carry equal weight though different parts of the same question may be weighted differently.

Duration. You have 3 hours to write this exam.

Allowed Material. Basic calculators, not capable of displaying text or sounding speech.

Good Luck!

Problem 1. Prove the "replacement lemma": Let G be a set of g vectors in some vector space V and let L be some set of l linearly independent vectors in V (where q and l are both finite). Assume that Span $L \subset \text{Span } G$. Then $g \geq l$ and there is a subset R of G, consisting of r := g - l vectors, so that $\operatorname{Span}(R \cup L) = \operatorname{Span} G$.

Problem 2.

- 1. Let $L: P_3(\mathbb{R}) \to \mathbb{R}^3$ be the linear transformation given by $L(p) = \begin{pmatrix} p(-2) \\ p(0) \\ p(2) \end{pmatrix}$. Find the matrix A representing L relative to the basis $\{1, x, x^2, x^3\}$ of $P_3(\mathbb{R})$ and the standard basis of \mathbb{R}^3 .
- 2. Let w = a + bi be a complex number and let $T : \mathbb{C} \to \mathbb{C}$ be defined by $T(z) = w \cdot z$. Considering \mathbb{C} as a vector space over \mathbb{R} , find the matrix B representing T relative to the basis $\{1, i\}$ of \mathbb{C} .

Find all the solutions (if any exist) of the following two systems of linear

For part
$$x_1$$
 and x_2 and x_3 and x_4 and x_4 and x_4 and x_5 and x_5

Problem 4. Let $A \in M_{n \times n}(F)$ have the form

Sign at just many led the solution,
$$A = \begin{pmatrix} 0 & 0 & 0 & \cdots & 0 & a_0 \\ -1 & 0 & 0 & \cdots & 0 & a_1 \\ 0 & -1 & 0 & \cdots & 0 & a_2 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & \cdots & -1 & a_{n-1} \end{pmatrix}$$
. $\rightarrow t^n + \sum_{k=0}^{n-1} t^k$

- 1. Compute $\det(A + tI)$, where I is the $n \times n$ identity matrix.
- 2. (3 point bonus). What does your result tell you about characteristic polynomials?

Problem 5. Let A be the matrix
$$A = \begin{pmatrix} 1 & 0 \\ 3 & -2 \end{pmatrix}$$
.

- 1. Find a matrix P for which $P^{-1}AP$ is diagonal.
- 2. Compute A^7 .

57 A.A.A ...

$$A^{7} = \begin{pmatrix} 1 & 3 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & -178 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$$

$$= \begin{pmatrix} 1/29 & -178 \end{pmatrix}$$

Good Luck!

STUDENT SURVEY FORM UNIVERSITY OF TORONTO



Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.							
Using an HB pencil or a blue or black ball-point pen (but not a corresponding to your response for each statement. If using a pen							ion.
Part II (on the reverse side) requires a written answer.							
Course Identification: Please print course and section you are evalua	ting						
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COURSE WHT 2 4 0 B SECTION				INSTRU	JCTOR	(S):	
1. If evaluating only one instructor, write the name in the upper (A) box.	If evaluating	A:	BA	R-NAT	FAN		
two instructors, write their names, one in box A and the other in box		B:	De				
DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FO	ORM		0,5	ane-G-1 1 G			
Statements about the instructor(s): Respond to the statements below for instructor A (and instructor B	bearing in	mind tl	nat ther	e are wide	variatio	ns in cla	ıss size
and subject matter in Arts and Science.							
and subject matter in Arts and Science.	extremely poor	very	poor	adequate	good	very	outstanding
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			very low	low	below	average	above	high	very high
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STUDENT SURVEY FORM UNIVERSITY OF TORONTO





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	Using an HB pencil or a blue or black ball-point pen (but not a fo corresponding to your response for each statement. If using a pen,			-	3.70			ion.
9	Part II (on the reverse side) requires a written answer.							
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	If evaluating only one instructor, write the name in the upper (A) box. two instructors, write their names, one in box A and the other in box E		,		r-Naic	i / T		
	DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FO		B:	-				
Sta	tements about the instructor(s):							
Res	pond to the statements below for instructor A (and instructor B)	bearing in	mind t	hat there	e are wide	variatio	ns in cla	ıss size
and	subject matter in Arts and Science.	-						
		extremely	very	poor	adequate	good	very	outstanding
2.	Communicates goals and requirements of the course clearly	poor	poor	poor	adequate	good	good	outstanding
2.	Communicates goals and requirements of the course clearly and explicitly.	poor A: ①	poor 2	3	4	(5)	good	7
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3. 4. 5. 6. 7. 8.	and explicitly. Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation of student learning. Presents material in an organized, well-planned manner. Explains concepts clearly with appropriate use of examples. Communicates enthusiasm and interest in the course material. Attends to students' questions and answers them clearly and effectively. Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course. Ensures that student work is graded fairly, with helpful comments	Poor A: ① B: ①	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 3 3 3 3 3 3 3 3		(5) (5) (5) (5) (5) (5)	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	
3. 4. 5. 6. 7. 8.	uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation of student learning. Presents material in an organized, well-planned manner. Explains concepts clearly with appropriate use of examples. Communicates enthusiasm and interest in the course material. Attends to students' questions and answers them clearly and effectively. Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course. Ensures that student work is graded fairly, with helpful comments and feedback where appropriate.	Poor A: 10 B: 11 A: 10 B: 11 A: 10 B: 11 A: 11 B: 11	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 3 3 3 3 3 3 3		\$ 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	good 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	
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tatements about the cours	se: Respon	d to the stat	tements belo	w, using t	he follow	ing 7-poi	nt scale.			SIDE 2
	-			very low	low	below	average	above	high	very
2. Compared to other courses at work load is				o	(2)	average	(4)	average	(6)	high
Compared to other courses at	the same le	vel, the level	of difficulty of	of			-			
the material is					2	(3)	(4)	(5)	6	7
(If applicable) The value of the	tutorials is			1	With	(3)	4	(5)	6	7
(If applicable) The value of the(If applicable) The value of the					(2)	(3)	4	(5)	6	7
8. (If applicable) The value of the	language co	onversation	classes is	1	2	(3)	4	(5)	6	7
 The value of the overall learning. Considering your experience value. 	ng experienc	e is	rogording vol	r pood for	(2)	3	4	(5)	6	200
meet program or degree requi						Ye	s	O No		
 Number of full course credits 0-4½ 5-9½ Status of the course for you: Program Requirement 	-	10-141/2	4 15-19 ¹ /2	. (5) ≥20	readth Req		(4)	Optiona	ı
 Your level of enthusiasm to ta low medium 	ke this cour ourse:		e of initial reg	istration:	≥80	readiii neq	uirement		Ориона	
 Your level of enthusiasm to ta low medium Your expected grade in this co 	uestions v	se at the tim high 60-69	e of initial reg	ied in cl	ass:	(S 6 7) (S 6 7)	uirement	34. ① 35. ①	230	D (5) (6) (1)
3. Your level of enthusiasm to ta 1 low 2 medium 4. Your expected grade in this co 1 <50 2 50-59 additional statements or q 25. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 RT II: PLEASE ANSWER ON In the instructor(s) or course. Fo	uestions v 28. 10 29. 10 30. 10 TLY AFTER r example, y	se at the time high 60-69 which mar 2 3 4 5 2 3 4 5 COMPLE 7 you may wis	e of initial reg	ied in cl 31. 32. 33.	ass:	0 5 6 7 0 5 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 (1 5 6 6) (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6
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3. Your level of enthusiasm to ta low 2 medium	uestions verse: 28. 10 29. 10 30. 10 (IV AFTER rexample, yetruction in	which ma 2 3 4 5 2 3 4 5 2 3 4 5 complex course, the time	y be supple of initial reg	ied in cl 31. 32. 33. I. Please u	ass:	6 6 7 6 6 7 6 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 0 1 5 6 0 1 5 6 0
3. Your level of enthusiasm to ta low 2 medium	uestions verse: 28. 10 29. 10 30. 10 (IV AFTER rexample, yetruction in	which ma 2 3 4 5 2 3 4 5 2 3 4 5 complex course, the course.	y be supple of initial reg	ied in cl 31. 32. 33. I. Please u	ass:	6 6 7 6 6 7 6 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 0 1 5 6 0 1 5 6 0
3. Your level of enthusiasm to ta 1 low 2 medium 4. Your expected grade in this co 1 <50 2 50-59 dditional statements or q 25. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 27. 1 2 3 6 6 7 28T II: PLEASE ANSWER ON a the instructor(s) or course. For aggestions for improving the instruction of the instruction o	uestions verse: 28. 10 29. 10 30. 10 (IV AFTER rexample, yetruction in	which ma 2 3 4 5 2 3 4 5 2 3 4 5 complex course, the course.	y be supple of initial reg	ied in cl 31. 32. 33. I. Please u	ass:	6 6 7 6 6 7 6 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 (1 5 6 6) (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6
dditional statements or questions for improving the instructor(s) or course. For improving the instructor of the instruc	uestions values of the course	which ma 2 3 4 5 2 3 4 5 2 3 4 5 complex course, the course.	y be supple of initial reg	ied in cl 31. 32. 33. I. Please u	ass:	6 6 7 6 6 7 6 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 (1 5 6 6) (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6
dditional statements or questions for improving the instructor(s) or course. For gestions for improving the instructor of the instructor o	uestions verse: 28. 10 29. 10 30. 10 (IV AFTER rexample, yetruction in	which ma 2 3 4 5 2 3 4 5 2 3 4 5 complex course, the course.	y be supple of initial reg	ied in cl 31. 32. 33. I. Please u	ass:	6 6 7 6 6 7 6 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 (1 5 6 6) (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6 (1 5 6
dditional statements or questions for improving the instructor(s) or course. For gestions for improving the instructor of the instructor o	uestions values of the course	which ma 2 3 4 5 2 3 4 5 2 3 4 5 complex course, the course.	y be supple of initial reg	ied in cl 31. 32. 33. I. Please u	ass:	6 6 7 6 6 7 6 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 (1 5 6 (2 commer
dditional statements or q 5. 1 2 3 4 5 6 7 7 7 7. 1 2 3 4 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	uestions values of the course	which ma 2 3 4 5 2 3 4 5 2 3 4 5 complex course, the course.	y be supple of initial reg	ied in cl 31. 32. 33. I. Please u	ass:	6 6 7 6 6 7 6 6 7 ace below	to provid	34. ① 35. ① 36. ①	2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3 (2 3	1 5 6 (1 5 6 (commer

STUDENT SURVEY FORM UNIVERSITY OF TORONTO



FACULTY OF ARTS & SCIENCE

Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.							
Using an HB pencil or a blue or black ball-point pen (but not a corresponding to your response for each statement. If using a per				· · · · · · · · · · · · · · · · · · ·			ion.
Part II (on the reverse side) requires a written answer.							
Course Identification: Please print course and section you are evaluate	ating						
COURSE MATQUELLE SECTION SECTION			2		UCTOR	80 K	
1. If evaluating only one instructor, write the name in the upper (A) box		g A:	Dror	Bar	Natan		
two instructors, write their names, one in box A and the other in box DO NOT EVALUATE TEACHING ASSISTANTS ON THIS F		B:					
Statements about the instructor(s):							
Respond to the statements below for instructor A (and instructor B and subject matter in Arts and Science.	bearing in	n mind t	hat ther	e are wide	variatio	ns in cla	ass size
	extremely poor	very poor	poor	adequate	good	very	outstanding
2. Communicates goals and requirements of the course clearly				(7)	(8)		-
and explicitly.	B: ①	(2)	(3)	4	5	6	7
Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation	1						
of student learning	B: ①	2	3	4	(5)	6	7
4. Presents material in an organized, well-planned manner	A: ①			4	(5)	6	9
	B: ①	(2)	3	4		6	(7)
5. Explains concepts clearly with appropriate use of examples		(2)		4	(5)	(6)	
	B: ①	(2)		4	(5)	(6)	(7)
6. Communicates enthusiasm and interest in the course material				(4)	(5)		9
7. Attends to students' questions and answers them clearly	B: ①	(2)		4	(5)	6	(7)
and effectively.	A: ①			4		(6)	0
8. Is available for individual consultation, by appointment or stated	B: ①	(2)	3	4	(5)		7
office hours, to students with problems relating to the course	A: 🕕	(2)		(4)	(5)	(6)	
	B: ①	(2)	(3)	(4)			(7)
Ensures that student work is graded fairly, with helpful comments and feedback where appropriate.	A: ①	(2)	(3)	(4)		(6)	(a)
and research miner appropriate to the territorial transfer to	B: ①	(2)	3	4	(5)	6	(7)
10. Ensures that student work is graded within a reasonable time	A: ①	(2)	3	4	(5)	(6)	-
	B: ①	(2)	(3)	4	(5)	6	(7)
11. All things considered, performs effectively as a university teacher.	A: (1)	(2)	(3)	4	(5)	6	408
go oonolooloo, pononno onocerory do a anivoroity todonon	B: ①			4	(5)	6	(7)
					54		

Statements about the course: Respond to the statements below,	using the	e follow	ing 7-poi	nt scale.		S	SIDE 2
	very low	low	below	average	above	high	yery
12. Compared to other courses at the same level (100,200,300,400), the			average		average		very high
work load is	1	(2)	(3)	•	5	(6)	7
Compared to other courses at the same level, the level of difficulty of the material is	(1)	(2)	(3)	(4)	(5)	.550	(7)
14. The value of the required reading is		(2)	(3)	(4)	(5)	6	
15. (If applicable) The value of the tutorials is			(3)	(4)	(5)	(6)	7
16. (If applicable) The value of the laboratories is	(T)	(2)	(3)	(4)	(5)	(6)	(7)
17. (If applicable) The value of the seminars is		(2)	(3)	(4)	(5)	(5)	(7)
18. (If applicable) The value of the language conversation classes is		(2)	(3)	(4)	(5)	(6)	(7)
19. The value of the overall learning experience is		(2)	(3)	(4)	(5)	400	(7)
20. Considering your experience with this course, and disregarding your i	need for it	to					
meet program or degree requirements, would you still have taken this	course?		Ye.	S	O No		
1 0-41/2 5-91/2 3 10-141/2 4 15-191/2 22. Status of the course for you: Program Requirement 2 Selected from a required list in a program low medium 2 high 24. Your expected grade in this course: 1 <50 2 50-59 3 60-69 4 70-79	gram tration:	≥20 ③ Bi ≥80	readth Req	uirement	4	Optional	
Additional statements or questions which may be supplied	d in clas	ss:					
25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7			5 6 7		34. 🕕	234	5 6 7
26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7			5 6 7			2 3 4	
27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7	33. 🕕	2 3 4	5 6 7		36. ①	2 3 4	5 6 7
PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. on the instructor(s) or course. For example, you may wish to give the resuggestions for improving the instruction in the course.							

Dror has a well structured lecture style

STUDENT SURVEY FORM UNIVERSITY OF TORONTO



INSTRUCTOR(S):

Bar - Natan.

A:

B:

Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection.

SECTION

Part II (on the reverse side) requires a written answer.

COURSE

Course Identification: Please print course and section you are evaluating

 If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B.

DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM

Sta	tements about the instructor(s):							
Res	pond to the statements below for instructor A (and instructor B)	bearing in	n mind th	at ther	e are wide	variatio	ns in cla	ass size
and	l subject matter in Arts and Science.							
		extremely poor	very poor	poor	adequate	good	very	outstanding
2.	Communicates goals and requirements of the course clearly and explicitly.	A: ①	(2)		4	•	6	7
3.	Uses methods of evaluation (e.g. papers, assignments, tests) that	B: ①	2	(3)	4		6	(7)
	appropriately reflect the subject matter and provide a fair evaluation of student learning.	A: ①	2	(3)	-		(6)	7
	of student learning.	B: ①	2	3	(4)	(5)	6	7
4.	Presents material in an organized, well-planned manner		2	(3)	(4)		(6)	•
	S	B: ①	2		4	5	(6)	(7)
5.	Explains concepts clearly with appropriate use of examples	A: ① B: ①	(2)	3	<u>4</u>		6	7
6.	Communicates enthusiasm and interest in the course material	A: ①	(2)	(3)	4	(5)	6	
7	Attends to students' questions and answers them clearly	B: ①	(2)		4		(6)	7
	and effectively.	A: ① B: ①		(3)	(<u>4</u>)		6	(7)
8.	Is available for individual consultation, by appointment or stated	ARTON - LO	2	(3)	(4)			(7)
	office hours, to students with problems relating to the course	A: 1 B: 1	(2)	(3)	4)		(6)	(7)
9.	Ensures that student work is graded fairly, with helpful comments and feedback where appropriate.	A: ①		(3)	4	(5)		(7)
		B: ①	2	(3)	4		6	(7)
10.	Ensures that student work is graded within a reasonable time	A: ①	(2)		(4)	(5)	6	(7)
44	All things considered, performs effectively as a university teacher.		2		(4)	(5)		
116	All tillings considered, periorins effectively as a diliversity leadilei	P. (1)			(4)			(7)

tatements al	out the course	Respon	nd to the st	atements below	, using th	e follow	ing 7-poi	nt scale.		3	SIDE 2
Compared to	other courses at ti	ao camo l	loval (100 20	0 200 400\ the	very low	low	below	average	above average	high	very high
work load is	other courses at the				. O	(2)	3	4	•	6	(7)
the material	is				. <u>1</u>	2	3	4		6	7
	the required reading) The value of the to					2	3	4	5	6	7
6. (If applicable) The value of the la	aboratori	es is		. O	(2)	(3)	4	(5)	6	7
	 The value of the s The value of the la 					2	3	4	5	6	7
	the overall learning your experience wi					2	3	4		(6)	7
	n or degree require					. 10	Ye	s	O No)	
	out yourself:										
1. Number of for	ull course credits al		rned (prior to	o this session):	(5)	≥20					
2. Status of the	course for you:										
	Requirement feathusiasm to take			quired list in a prome of initial region		(3) Bi	eadth Rec	uirement	(4)	Optional	
① low	medium	(3	high	.							
AND CONTRACTOR OF THE PROPERTY.	ed grade in this cou	ırse:				10 02020					
(1) <50	② 50-59		60-69	4 70-79		≥80					
		<u>3</u>	NAME OF THE PARTY							15	
dditional st	atements or qu	estions.	which m	ay be suppli	ed in cla	ss:					
	atements or qu	estions 28. ①	NAME OF THE PARTY	ay be supplie	ed in cla	\$\$: ② ③ ④	567			2 3 4 2 3 4	
dditional st	atements or qu	estions 28. 1 29. 1	which m	ay be supplie	ed in class 31. 11 32. 11	SS: (2) (3) (4) (2) (3) (4)			35. 🕦		5 6 7
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4	atements or qu 5 6 7 5 6 7 5 6 7	estions 28. ① 29. ① 30. ①	which m 2 3 4 5 2 3 4 5	ay be supplied to the supplied	ed in cla 31. ① 32. ① 33. ①	SS: 2 3 4 2 3 4 2 3 4	567)	35. <u>1</u> 36. <u>1</u>	234	560
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4	atements or qu 5 6 7 5 6 7 5 6 7 E ANSWER ONL	estions 28. 1 29. 1 30. 1	which m	ay be supplice of the supplice	ed in classification 31. (1) 32. (1) 33. (1)	ss: 2 3 4 2 3 4 2 3 4	5 6 7 5 6 7 ace below	to provid	35. ① 36. ① e supplen	2 3 4 2 3 4 nentary o	ommen
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4 RT II: PLEAS	atements or qu 5 6 7 5 6 7 5 6 7	estions 28. 1 29. 1 30. 1	which may be a simple of the companies of the compani	ay be supplice of the supplice	ed in classification 31. (1) 32. (1) 33. (1)	ss: 2 3 4 2 3 4 2 3 4	5 6 7 5 6 7 ace below	to provid	35. ① 36. ① e supplen	2 3 4 2 3 4 nentary o	ommen
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4 RT II: PLEAS 1 the instructor	atements or qu 5 6 7 5 6 7 5 6 7 E ANSWER ONL r(s) or course. For a	estions 28. 1 29. 1 30. 1 Y AFTE example, ruction in	which may we have course	ay be supplice of the supplice	an classification of the second secon	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 5. 1 2 3 4 6. 1 2 3 4 7. 1 2 3 4 RT II: PLEAS	atements or qu 5 6 7 5 6 7 5 6 7 E ANSWER ONL r(s) or course. For a	estions 28. 1 29. 1 30. 1 Y AFTE example, ruction in	which may we have course	ay be supplice of the supplice	an classification of the second secon	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 5. 1 2 3 4 6. 1 2 3 4 7. 1 2 3 4 RT II: PLEAS	atements or qu 5 6 7 5 6 7 E ANSWER ONL r(s) or course. For	estions 28. 1 29. 1 30. 1 Y AFTE example, ruction in	which may we have course	ay be supplice of the supplice	an classification of the second secon	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 5. 1 2 3 4 6. 1 2 3 4 7. 1 2 3 4 RT II: PLEAS	atements or qu 5 6 7 5 6 7 5 6 7 E ANSWER ONL r(s) or course. For a	estions 28. 1 29. 1 30. 1 Y AFTE example, ruction in	which may we have course	ay be supplice of the supplice	an classification of the second secon	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	commen
dditional st 5. 1 2 3 4 6. 1 2 3 4 7. 1 2 3 4 RT II: PLEAS	atements or qu 5 6 7 5 6 7 5 6 7 E ANSWER ONL r(s) or course. For a	estions 28. 1 29. 1 30. 1 Y AFTE example, ruction in	which may we have course	ay be supplice of the supplice	an classification of the second secon	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 5. 1 2 3 4 6. 1 2 3 4 7. 1 2 3 4 RT II: PLEAS	atements or qu 5 6 7 5 6 7 5 6 7 E ANSWER ONL r(s) or course. For a	estions 28. 1 29. 1 30. 1 Y AFTE example, ruction in	which may we have course	ay be supplice of the supplice	an classification of the second secon	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4 RT II: PLEAS	atements or qu 5 6 7 5 6 7 5 6 7 E ANSWER ONL r(s) or course. For a	estions 28. 1 29. 1 30. 1 X AFTE example, ruction in	which may we have course	ay be supplice of the supplice of the supplice of the supplice of the supplication of	an classification of the second secon	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4 RT II: PLEAS	atements or que 5 6 7 5 6 7 E ANSWER ONI r(s) or course. For a mproving the instr	estions 28. 1 29. 1 30. 1 Y AFTE example, ruction in	which may we have course	ay be supplice of the supplice of the supplice of the supplication	ed in classification of the second of the se	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4 RT II: PLEAS	atements or que 5 6 7 5 6 7 E ANSWER ONI r(s) or course. For a mproving the instr	estions 28. 1 29. 1 30. 1 X AFTE example, ruction in	which may we have course	ay be supplice of the supplice of the supplice of the supplication	ed in classification of the control	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 25. 1 2 3 4 26. 1 2 3 4 27. 1 2 3 4 RT II: PLEAS 1 the instructor	atements or que 5 6 7 5 6 7 E ANSWER ONI r(s) or course. For a mproving the instr	estions 28. 1 29. 1 30. 1 X AFTE example, ruction in	which may we have course	ay be supplice of the supplice of the supplice of the supplication	ed in classification of the control	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommen
dditional st 5. 1 2 3 4 6. 1 2 3 4 7. 1 2 3 4 RT II: PLEAS	atements or que 5 6 7 5 6 7 E ANSWER ONI r(s) or course. For a mproving the instr	estions 28. 1 29. 1 30. 1 X AFTE example, ruction in	which may we have course	ay be supplice of the supplice of the supplice of the supplication	ed in cla. 31. 1 32. 1 33. 1	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommer
dditional st 5. 1 2 3 4 6. 1 2 3 4 7. 1 2 3 4 RT II: PLEAS	atements or que 5 6 7 5 6 7 E ANSWER ONI r(s) or course. For a mproving the instr	estions 28. 1 29. 1 30. 1 X AFTE example, ruction in	which may we have course	ay be supplice of the supplice of the supplice of the supplication	ed in cla. 31. 1 32. 1 33. 1	ss: 2 3 4 2 3 4 2 3 4 2 3 4 your nu	5 6 7 5 6 7 ace below merical ev	to provid valuations	35. 1 36. 1	2 3 4 2 3 4 nentary o	ommer

STUDENT SURVEY FORM UNIVERSITY OF TORONTO



Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

Usi cor Par Col CC 1. If e two	I: INSTRUCTIONS. PLEASE READ FIRST. Ing an HB pencil or a blue or black ball-point pen (but not a firesponding to your response for each statement. If using a pencit II (on the reverse side) requires a written answer. In the reverse side of each statement. If using a pencit II (on the reverse side) requires a written answer. In the reverse side of requires a written answer. In the reverse side of requires a written answer. SECTION SECTION DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FOR the restriction of the statements below for instructor A (and instructor B) abject matter in Arts and Science.	ting If evaluating ORM	g A:	l respon	INSTRI	uctor	(S):	Jerus uss size
CO 1. If e two	responding to your response for each statement. If using a pentit II (on the reverse side) requires a written answer. The property of the statement of the reverse side of the reverse si	if evaluating ORM bearing in	g A: B:	hat there	INSTRU	UCTOR((S):	Jan
CO 1. If e two State: Respo and su	PURSE MAT 7 9 SECTION Evaluating only one instructor, write the name in the upper (A) box. to instructors, write their names, one in box A and the other in box DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FOrments about the instructor(s): Indication: Please print course and section you are evaluated as a sec	If evaluating B. DRM	g B:	hat there	POY	variation	Na in cla	uss size
1. If e two	evaluating only one instructor, write the name in the upper (A) box. o instructors, write their names, one in box A and the other in box DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FOrments about the instructor(s): Indicate the instructor of the statements below for instructor A (and instructor B)	If evaluating B. DRM	g B:	hat there	POY	variation	Na in cla	uss size
1. If e two	evaluating only one instructor, write the name in the upper (A) box. o instructors, write their names, one in box A and the other in box DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FOrments about the instructor(s): Indicate the instructor of the statements below for instructor A (and instructor B)	B. ORM bearing in	g B:	hat there	POY	variation	Na in cla	uss size
1. If e two	evaluating only one instructor, write the name in the upper (A) box. o instructors, write their names, one in box A and the other in box DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FOrments about the instructor(s): Indicate the instructor of the statements below for instructor A (and instructor B)	B. ORM bearing in	g B:	hat there	POY	variation	Na in cla	uss size
State: Respo and su	DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FO ments about the instructor(s):	B. ORM bearing in	g B:	hat there			ns in cla	uss size
Respo and su	ments about the instructor(s): nd to the statements below for instructor A (and instructor B)	bearing in					very	
Respo and su	nd to the statements below for instructor A (and instructor B)	extremely					very	
		DOOT				good		Outotuniang
2. Cc	mmunicates goals and requirements of the course clearly	Poor	poor	poor	adequate		good	
	d explicitly.	. A: ①		(3)	4	(5)	(6)	0
3. Us	ses methods of evaluation (e.g. papers, assignments, tests) that propriately reflect the subject matter and provide a fair evaluation	B: ①	(2)		4	(5)	6	7
of	student learning.	A: 1	2	3	4	(5)	6	7
								480
4. Pr	esents material in an organized, well-planned manner	B: 1	2	3	(4) (4)	(5)	6	7
5 Ev	plains concepts clearly with appropriate use of examples	Δ. ①	(2)	(3)	(A)		(6)	GP .
J. L.	plants concepts clearly with appropriate use of examples	B: ①	2		4	(5)	(6)	(7)
6. Co	ommunicates enthusiasm and interest in the course material		2		4	(5)	6	Gin
7 Δ i	tends to students' questions and answers them clearly	B: ①	(2)		(4)	(5)	6	
	d effectively.	. A: ①		(3)	4	(5)	(6)	@
		B: ①	2	(3)	4		6	7
8. Is	available for individual consultation, by appointment or stated fice hours, to students with problems relating to the course	A • (1)	(2)		(4)	6	(6)	(7)
01	nce flours, to students with problems relating to the course	B: ①			(4)	(5)	(6)	(7)
	sures that student work is graded fairly, with helpful comments							
an	d feedback where appropriate				(4)	(5)		7
		B: ①	(2)		(4)		6	0
10. Er	sures that student work is graded within a reasonable time	. A: ①		(3)	4	6	6	7
		B: ①	(2)		4		6	7
11 AI	I things considered, performs effectively as a university teacher.	Δ. (1)	(2)	(3)	(4)	(5)	6	
III. AI	i dinigo considered, periornio enectively as a diniversity teacher.	B: ①	(2)	(3)	4		(6)	(7)

Statements about the course: Respond to the statements below	, using the	follov	ving 7-poi	nt scale.		5	SIDE 2
45	very low	low	below	average	above	high	very high
12. Compared to other courses at the same level (100,200,300,400), the work load is	(f)	(2)	average	(4)	average	(6)	(7)
13. Compared to other courses at the same level, the level of difficulty of							
the material is	. ①	2	3	4	(5)	6	7
15. (If applicable) The value of the tutorials is	. 1	(2)	3	4		6	7
(If applicable) The value of the laboratories is		2	3	(4)	(5)	6	7
18. (If applicable) The value of the language conversation classes is	①	(2)	3	4	(5)	6	7
The value of the overall learning experience is		2	(3)	4	(5)	6	
meet program or degree requirements, would you still have taken this		.0	🦚 Ye	S	O No		
Statements about yourself: 21. Number of full course credits already earned (prior to this session): 1 0-41/2 2 5-91/2 10-141/2 4 15-191/2 22. Status of the course for you: Program Requirement 2 Selected from a required list in a process. Your level of enthusiasm to take this course at the time of initial regist in low 2 medium high 24. Your expected grade in this course:			Breadth Req	uirement	4	Optional	
① <50 ② 50-59 ③ 60-69 ④ 70-79	◎ ≥	80					
Additional statements or questions which may be supplied	ed in class	20					
25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7	31. ① ① 32. ① ②	2 3 (4 5 6 7 4 5 6 7 4 5 6 7		35. 🕕	2 3 4	5 6 7 5 6 7 5 6 7
on the instructor(s) or course. For example, you may wish to give the resuggestions for improving the instruction in the course.			11		01 P10.11	o op oom	
Best Man Tea	Cuy		J'a	ne			
Best Man Tea	Cue		J'd	ne			
Best Man Tea	Cuy		J'a	ne			
Best Man Tea	Cuy		J'a	ne			
Best Man Tea	Cuy			n			
Best Man Tea	Cuy			ne			
Best Man Tea	Cuy			ne			
Best Man Tea	Cuy			n			
Best Man Tea	Cuy			N			
Best Man Teal ewr bad	Cuy			ne			
Best Man Teal ewr bad	Cuy			n			
Best Man Tear	Cuy			ne			
Best Man Tear	Cuy			n			
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Best Man Tear	Cuy			N			
Best Man Tear	Che			ne			
Best Man Tear	Che						

STUDENT SURVEY FORM UNIVERSITY OF TORONTO



Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection.

PART I: INSTRUCTIONS, PLEASE READ FIRST.

Part II (on the reverse side) requires a written answer. Course Identification: Please print course and section you are evaluating **COURSE** SECTION INSTRUCTOR(S): 1. If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B. B: DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM Statements about the instructor(s): Respond to the statements below for instructor A (and instructor B) bearing in mind that there are wide variations in class size and subject matter in Arts and Science. outstanding extremely adequate good very 2. Communicates goals and requirements of the course clearly 3. Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation B: ① A: 5. Explains concepts clearly with appropriate use of examples. A: (1 B: (1 6. Communicates enthusiasm and interest in the course material. A: 1 7. Attends to students' questions and answers them clearly 8. Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course. . . . B: (1) 9. Ensures that student work is graded fairly, with helpful comments B: 1 10. Ensures that student work is graded within a reasonable time. A: 1 11. All things considered, performs effectively as a university teacher. .. A:

Statements about the course: Respond to the statements below, u	sing th	e follow	ing 7-poi	nt scale.		S	IDE 2
Compared to other courses at the same level (100,200,300,400), the work load is	ery low	low	below average	average	above average	high	very high
the material is 14. The value of the required reading is 15. (If applicable) The value of the tutorials is 16. (If applicable) The value of the laboratories is 17. (If applicable) The value of the seminars is 18. (If applicable) The value of the language conversation classes is		2 2 2 2 2	3 3 3 3 3	(4) (4) (4) (4) (4)	6 5 5 5	6 6 6 6	7 7 7 7
The value of the overall learning experience is	ed for it	t to	③ Ye	s	S No		7
Statements about yourself: 21. Number of full course credits already earned (prior to this session): 0-4½ 2 5-9½ 3 10-14½ 4 15-19½ 2 Status of the course for you: Program Requirement Selected from a required list in a programation of the course of the course at the time of initial registration of the course of the course at the time of initial registration of the course at the time of initial registration of the course at the time of initial registration of the course at the time of initial registration of the course at the time of initial registration of the course at the time of initial registration of the course at the time of initial registration of the course of the cours	am	≥20 ③ Br	eadth Req	uirement	4	Optional	5
24. Your expected grade in this course: 1 <50 2 50-59 3 60-69 4 70-79	0	≥80					
Additional statements or questions which may be supplied 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7	31. ① 32. ①	234	5 6 7 5 6 7 5 6 7		35. 🕦	2 3 4	5 6 7 5 6 7 5 6 7
PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. P on the instructor(s) or course. For example, you may wish to give the reas suggestions for improving the instruction in the course.	ons for	your nu	merical ev	raluations	or provid	e specifi	c
It was an honour to ! Apart from the cone classes led to an in	e se	fen mo la	ight der reel	tel	y D	Roe.	
for a Mathematics	im	M	l.				ation
			e#				
							×

STUDENT SURVEY FORM





Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval

PART I: INSTRUCTIONS, PLEASE READ FIRST.

corresponding to your response for each statement. If using a pen, do not alter original response by making another selection. Part II (on the reverse side) requires a written answer. Course Identification: Please print course and section you are evaluating **COURSE SECTION** INSTRUCTOR(S): P. Dor Bar-Noton A: 1. If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B. B: DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM Statements about the instructor(s): Respond to the statements below for instructor A (and instructor B) bearing in mind that there are wide variations in class size and subject matter in Arts and Science. outstanding adequate good very poor poor 2. Communicates goals and requirements of the course clearly 3. Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation A: 5. Explains concepts clearly with appropriate use of examples. A: B: 6. Communicates enthusiasm and interest in the course material. A: 7. Attends to students' questions and answers them clearly A: 1 8. Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course. . . 9. Ensures that student work is graded fairly, with helpful comments A: 1 B: (1) A: 1 10. Ensures that student work is graded within a reasonable time. B: 1 A: 1 11. All things considered, performs effectively as a university teacher. . .

Statements about the course: Respond to the statements below	using the	e follo	wing 7-poir	nt scale.		3	SIDE 2
12. Compared to other courses at the same level (100,200,300,400), the	very low	low	below average	average	above average	high	very high
work load is	. 1	2	3	4	6	6	7
the material is	. 1	2	(3)	4	(5)	6	7
15. (If applicable) The value of the tutorials is	. 1	2	3	4	5	6	T
17. (If applicable) The value of the seminars is	. 1	2	(3)	4	(5)	(6)	7
(If applicable) The value of the language conversation classes is The value of the overall learning experience is	(1)	2	3	4	5	6	7
 Considering your experience with this course, and disregarding your meet program or degree requirements, would you still have taken this 	need for II course?	to	Yes	S	O No		
Statements about yourself:							
21. Number of full course credits already earned (prior to this session):	(5)	≥20					
22. Status of the course for you:Program RequirementSelected from a required list in a program	gram	(3)	Breadth Req	uirement	4	Optional	12
23. Your level of enthusiasm to take this course at the time of initial regis 1 low 2 medium high	tration:		•			•	
24. Your expected grade in this course:							
① <50 ② 50-59 ③ 60-69 ● 70-79	(5)	≥80			1		
Additional statements or questions which may be supplied	d in clas	ss:					
25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7	31. ①	2 3	4 5 6 7		34. ①	2 3 4	5 6 7
26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7			4 5 6 7		2277		5 6 7
27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7	33. ①	2 3	4 5 6 7		36. ①	2 3 4	567

PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. Please use the space below to provide supplementary comments on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations or provide specific suggestions for improving the instruction in the course.

Give Dror a raise!

STUDENT SURVEY FORM UNIVERSITY OF TORONTO



ARTS & SCIENCE

Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection.

Part II (on the reverse side) requires a written answer.

Course Identification: Please print course and section you are evaluating

. If evaluation	ng only one instructor, write the na	ame in the upper (A) box. If evaluating	A: DROR BAR-NATAN
	ctors, write their names, one in bo		B:
DC	NOT EVALUATE TEACHING AS	SSISTANTS ON THIS FORM	

Respond to the statements below for instructor A (and instructor B) bearing in mind that there are wide variations in class size and subject matter in Arts and Science.

		extreme			or adequate	good	very	outstanding
2.	Communicates goals and requirements of the course clearly	•						
	and explicitly		2				(6)	190
		B: ①	2	(3	(4)	(5)	6	(7)
3.	Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation							
	of student learning		2				(6)	4
		B: ①	(2)	3	4	(5)	(6)	(7)
4.	Presents material in an organized, well-planned manner	A: ①					(6)	-
		B: ①	(2)	(3)	4		(6)	(7)
5.	Explains concepts clearly with appropriate use of examples	A: ①	(2)			(5)	6	9
		B: ①	(2)	3	4		(6)	7
6.	Communicates enthusiasm and interest in the course material	A: ①	2			(5)	(6)	0
		B: 1	(2)	(3)	(4)		(6)	7
7.	Attends to students' questions and answers them clearly							
	and effectively	A: ①						0
		B: ①	(2)	3	(4)		6	7
8.	Is available for individual consultation, by appointment or stated	2 -						
	office hours, to students with problems relating to the course					(5)	6	9
		B: ①	(2)	(3)	(4)	(5)	(6)	(7)
9.	Ensures that student work is graded fairly, with helpful comments	A. (1)		(3)		(5)	(6)	(7)
	and feedback where appropriate	B: 1					(6)	(7)
		D	(2)		4	(3)		W
10.	Ensures that student work is graded within a reasonable time	A: ①	(2)	3	4	(5)	6	©
		B: ①	2		(4)		6	(7)
11.	All things considered, performs effectively as a university teacher	A: ①	(2)	(3)	4	(5)	(6)	0
	n 1851 5 5	B: ①			(4)		(6)	(7)

Statements about the course: Respond to the statements below, using the following 7-point scale.		SIDE 2
very low low below average	above average	high very
work load is	(5)	6 7
13. Compared to other courses at the same level, the level of difficulty of the material is	(5)	6 7
14. The value of the required reading is	(5)	6 (3)
16. (If applicable) The value of the laboratories is	(5)	6 7
17. (If applicable) The value of the seminars is	(5)	6 7 6 7
19. The value of the overall learning experience is	(5)	6
meet program or degree requirements, would you still have taken this course? Yes	O No	
Statements about yourself: 21. Number of full course credits already earned (prior to this session):	4 C	Optional
① <50 ② 50-59 ③ 60-69 ◎ 70-79 ⑤ ≥ 80	1	
Additional statements or questions which may be supplied in class: 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 33. 1 2 3 4 5 6 7 PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. Please use the space below to provide	35. ① ② 36. ① ②	0 3 4 5 6 7 0 3 4 5 6 7 0 3 4 5 6 7
on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations suggestions for improving the instruction in the course.	or provide	specific
Excellent teaching style-enthu- about topic was contage	5125	m
a bout topic was contage	ous) ·

STUDENT SURVEY FORM

UNIVERSITY OF TORONTO



INSTRUCTOR(S):

A:

B:

Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection.

SECTION

Part II (on the reverse side) requires a written answer.

COURSE

Course Identification: Please print course and section you are evaluating

 If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B.

DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM

Sta	itements about the instructor(s):							
	pond to the statements below for instructor A (and instructor B) I subject matter in Arts and Science.	bearing in	mind t	hat ther	e are wide	variatio	ns in cla	ass size
		extremely poor	very	poor	adequate	good	very	outstanding
2.	Communicates goals and requirements of the course clearly and explicitly.	A: ①	2	(3)	4	(5)	6	notice.
3.	Uses methods of evaluation (e.g. papers, assignments, tests) that	B: ①	(2)		4	(5)	6	1
	appropriately reflect the subject matter and provide a fair evaluation of student learning.	A: ①	(2)	0	4	(5)	6	7
	Nº	B: ①	(2)	(3)	4		(6)	7
4.	Presents material in an organized, well-planned manner	A: ①	2	(3)	4	(5)	-	7
		B: ①	(2)	(3)	4		(6)	7
5.	Explains concepts clearly with appropriate use of examples	A: ①	(2)	(3)	4	(5)	D	(7)
		B: ①	(2)	3	4	(5)	(6)	7
6.	Communicates enthusiasm and interest in the course material				4	(5)	-	7
7.	Attends to students' questions and answers them clearly	B: ①	(2)		4		(6)	(7)
	and effectively.	A: 1	(2)		4	-	(6)	(7)
•		B: ①	2	3	4			(7)
8.	Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course	A: ①	(2)	(3)	(4)		(6)	(7)
	office flours, to students with problems relating to the course	B: 1		(3)	(4)		(6)	(7)
9.	Ensures that student work is graded fairly, with helpful comments							
	and feedback where appropriate		(2)	1	4		6	(7)
		B: ①	(2)		4		6	7
10.	Ensures that student work is graded within a reasonable time		(2)		4	1	6	(7)
		B: ①	2		4	(5)	6	(7)
11.	All things considered, performs effectively as a university teacher	A: 1		(3)	4	(5)	(<u>6</u>)	-
	5 959/ 21 at at	B: (1)	(2)	(3)	(4)		(6)	(7)

atements about the course: Respond to th	e statements below,	using the	followi	ng 7-poi	nt scale.			SIDE 2
		very low	low	below	average	above average	high	very high
. Compared to other courses at the same level (10								
work load is		1	(2)	(3)	-	(5)	6	(7)
. Compared to other courses at the same level, the		(1)	(2)	(3)	-	(5)	(6)	(7)
the material is		(1)	(2)	(3)	(4)	(5)	(6)	(7)
. (If applicable) The value of the tutorials is		ð	-2	(3)	(4)	(5)	6	7
. (If applicable) The value of the laboratories is		<u>a</u>	(2)	(3)	(4)	(5)	(6)	(7)
. (If applicable) The value of the seminars is		(i)	(2)	(3)	(4)	(5)	(6)	(7)
. (If applicable) The value of the language convers			(2)	(3)	4	(5)	-	(7)
. The value of the overall learning experience is .			(2)	(3)	4	(5)	6	(7)
atements about yourself:						į.		
	lauda dhia aaaalaa).							
Number of full course credits already earned (pri		(8)	> 00					
		(5)	≥20					
-0-41/2 2 5-91/2 3 10-141/2 • Status of the course for you:	2 4 15-19 ¹ / ₂			eadth Red	uirement	4)	Optional	
-0-41/2 2 5-91/2 3 10-141/2 Status of the course for you: Program Requirement 2 Selected from	4 15-19 $\frac{1}{2}$ a required list in a pro-	gram		eadth Req	uirement	4	Optional	
-0-41/2 2 5-91/2 3 10-141/2 • Status of the course for you:	4 15-19 $\frac{1}{2}$ a required list in a pro-	gram		eadth Req	uirement	4	Optional	
O-41/2 Status of the course for you: Program Requirement Vour level of enthusiasm to take this course at the low Your expected grade in this course:	a required list in a pro ne time of initial regis	gram tration:	③ Br	eadth Req	uirement	4	Optional	
O-41/2 Status of the course for you: Program Requirement Vour level of enthusiasm to take this course at the low medium 3 high	4 15-19 $\frac{1}{2}$ a required list in a pro-	gram tration:		eadth Req	uirement	4	Optional	

PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. Please use the space below to provide supplementary comments on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations or provide specific suggestions for improving the instruction in the course.

BAR-DATAN IS MID BEST PROFESSOR.

UNIVERSITY OF TORONTO



Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST. Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection. Part II (on the reverse side) requires a written answer. Course Identification: Please print course and section you are evaluating COURSE SECTION INSTRUCTOR(S): A: DROR BAR NATAN 1. If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B. B: DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM Statements about the instructor(s): Respond to the statements below for instructor A (and instructor B) bearing in mind that there are wide variations in class size and subject matter in Arts and Science. outstanding extremely adequate good very good poor poor 2. Communicates goals and requirements of the course clearly 3. Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation 4. Presents material in an organized, well-planned manner. 5. Explains concepts clearly with appropriate use of examples. A: B: 1 6. Communicates enthusiasm and interest in the course material. A: (1 B: 1 7. Attends to students' questions and answers them clearly and effectively. 8. Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course. . . 9. Ensures that student work is graded fairly, with helpful comments B: 1 10. Ensures that student work is graded within a reasonable time. B: ① 11. All things considered, performs effectively as a university teacher. . .

tatements about the course: Respond to the statements below,	using the	follow	ing 7-poi	nt scale.		3	SIDE 2
	very low	low	below	average	above	high	very high
. Compared to other courses at the same level (100,200,300,400), the work load is	(D)	(2)	average	(4)	average (5)	6	nign
Compared to other courses at the same level, the level of difficulty of		161	(3)	4/	(4)	0	-
the material is	1	(2)	(3)	4	(5)		(7)
The value of the required reading is	1	2	3	(4) (4)	(5)	6	7
(If applicable) The value of the laboratories is	1	2	3	4	(5)	6	(7)
(If applicable) The value of the seminars is	1	2	(3)	4	(5)	6	(7)
. (If applicable) The value of the language conversation classes is	(1)	2	(3)	4	(5)	6	7
 Considering your experience with this course, and disregarding your n 	need for it		(3)	-	(3)	(0)	-
meet program or degree requirements, would you still have taken this	course?		Ye	s	O No		
atements about yourself:							
Number of full course credits already earned (prior to this session):							
(3) 10-14 ¹ / ₂ (4) 15-19 ¹ / ₂	(5)	≥20					
Status of the course for you:	70.1270.707	(A) D			CTN :		
Program Requirement ② Selected from a required list in a prog Your level of enthusiasm to take this course at the time of initial regist	ram ration:	3 Br	eadth Req	uirement	(4)	Optional	
1 low 2 medium medium							
Your expected grade in this course: (1) <50 (2) 50-59 (3) 60-69 (4) 70-79	400	× 00					
<u>(1)</u> <50 <u>(2)</u> 50-59 <u>(3)</u> 60-69 <u>(4)</u> 70-79	-	≥80					
TII: PLEASE ANSWER ONLY AFTER COMPLETING PART I. It the instructor(s) or course. For example, you may wish to give the reagestions for improving the instruction in the course. BAR NATAN 15 AN EXC.		your nu	merical ev	raluations			
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STUDENT SURVEY FORM UNIVERSITY OF TORONTO



Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.							
Using an HB pencil or a blue or black ball-point pen (but not a	felt markin	g pen),	fill comp	oletely the	number	ed oval	
corresponding to your response for each statement. If using a per	ı, do not alte	er origin	al respon	se by maki	ng anoth	er select	ion.
Part II (on the reverse side) requires a written answer.							
Course Identification: Please print course and section you are evaluate	ating						
COURSE MAT240HIF SECTION				INSTRU	ICTOD	(C).	
SECTION SECTION		Γ.				(3):	
 If evaluating only one instructor, write the name in the upper (A) box two instructors, write their names, one in box A and the other in box 		9 —		Dmitry	Donin		
		В					
DO NOT EVALUATE TEACHING ASSISTANTS ON THIS F	ORM_						
Statements about the instructor(s):							
Respond to the statements below for instructor A (and instructor B) bearing in	ı mind t	hat ther	e are wide	variatio	ns in cla	ass size
and subject matter in Arts and Science.							
	extremely poor	very poor	poor	adequate	good	very good	outstanding
Communicates goals and requirements of the course clearly and explicitly	-	(2)	3	(4)	(5)		(7)
	B: 1	(2)	3	4	(5)	6	(7)
Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation	0						
of student learning.	B: 1	(2)	3	(4)	(5)	(6)	(7)
4 Presents material in an organized well-planned manner	Δ. 1	(2)	3	(4)	(5)	•	(7)
4. Presents material in an organized, well-planned manner	B: ①	(2)	(3)	(4)	(5)	6	(7)
5. Explains concepts clearly with appropriate use of examples	A: ①	(2)	(3)	(4)		6	(7)
	B: 1	(2)	(3)	(4)	5	6	(7)
6. Communicates enthusiasm and interest in the course material	<u>A: ①</u>	(2)	3	4	(5)	6	•
7. Attends to students' questions and answers them clearly	B: 🕕	(2)	3	(4).	(5)	(6)	(I)
and effectively.	A: 1	2	3	(4)	5	•	(7)
8. Is available for individual consultation, by appointment or stated	В:	2	3	4		6	D
office hours, to students with problems relating to the course		(2)	(3)	(4)	(5)	(6)	
9. Ensures that student work is graded fairly, with helpful comments	B: 1	(2)	(3)	(4)	5	(6)	(7)
and feedback where appropriate		(2)	(3)	4	5	(6)	
	B: 1	2	(3)	4	5	(6)	(7)
10. Ensures that student work is graded within a reasonable time. \dots	A: 1	2	3	(4)	5	(6)	
	B: 1	2	3	(4)	(5)	6	(7)
11. All things considered, performs effectively as a university teacher.	A: 1	(2)	(3)	4	(5)		(7)
200 NOTE	B: ①	(2)	3	(4)	5	(6)	(7)

Statements about the course: Respon	nd to the statements below,	using the	follow	ing 7-poir	nt scale.			SIDE 2
		very low	low	below	average	above	high	very high
12. Compared to other courses at the same I	evel (100,200,300,400), the			average		average		
work load is		1	(2)	(3)	4		6	7
the material is		1	2	3	4	5	-	7
14. The value of the required reading is		(1)	2	(3)	(4)	(5)	-	(7)
15. (If applicable) The value of the tutorials is	S	(1)	2	(3)	4	(5)		(7)
16. (If applicable) The value of the laboratoric	es is	(1)	(2)	(3)	(4)	(5)	6	(7)
17. (If applicable) The value of the seminars		(1)	(2)	(3)	(4)	(5)	6	7
18. (If applicable) The value of the language		1	(2)	(3)	(4)	(5)	6	(7)
19. The value of the overall learning experier			2	(3)	4	5		(7)
20. Considering your experience with this co			to					
meet program or degree requirements, w	ould you still have taken this	course?		Yes	3	O No		
23. Your level of enthusiasm to take this cou		ration:	Д.	eadth Requ	anomone		Optiona	*:
24. Your expected grade in this course: <50		⑤ s	s:	5 6 7	2	34. ①	2 3 4	0567
24. Your expected grade in this course: <50	60-69 4 70-79 which may be supplied	⑤ : l in clas	S: 2 3 4	5 6 7	2			0567
24. Your expected grade in this course: <50	which may be supplied 2 3 4 5 6 7 2 3 4 5 6 7	5 2 in clas 31. 1 (32. 1) (33. 1)	S: 2 3 4 2 3 4 2 3 4	5 6 7	9	35. ① 36. ①	2 3 4	567

STUDENT SURVEY FORM UNIVERSITY OF TORONTO



Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

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ing						
			INSTRI	UCTOR	(S):	
	g A:	Drop	BAR	-NA-	TAN	
3.	B:					
DRM						-
bearing ir	n mind tl	nat there	e are wide	variatio	ns in cla	ss size
extremely	very	poor	adequate	good	very	outstanding
	•	-	CEO.	4		
B: ①	(2)	(3)	(4)		6	7
-						
B: 1	(2)	(3)	(4) (4)	(5)	(6)	7
. A: ①	(2)	(3)	4	(5)	6	
B: ①	(2)	(3)	4	(5)	6	(7)
	(2)	(3)	4	(5)	6	•
B: ①	(2)		(4)		(6)	(7)
	2	(3)	4	5	(6)	•
В: 🕕	(2)	(3)	(4)	(5)	(0)	0
		(3)	4		. 6	
В: 🕕	(2)	(3)	(4)	5		
		(3)	4	(5)	6	
B: ①	(2)		(4)		(6)	(7)
		(3)	4	(5)	(6)	
B: ①	(2)		(4)		(6)	(7)
	2		4	(5)	(6)	•
B: ①	(2)	(3)	(4)	(5)	(6)	
			4	(5)	(6)	•
B: ①	(2)		4		(6)	D
	do not alto	do not alter origina do not alter origina	A:	INSTRIBLE INST	INSTRUCTOR A: VOR B: Continue Continu	INSTRUCTOR(S): A: OFOR BAR - VATA AV B: DRM bearing in mind that there are wide variations in cla extremely very poor adequate good very good A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 B: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 2 3 4 5 6 B: 1 2 3 4 5 6 A: 1 2 3 4 5 6 B: 1 3 4 5 6 B: 1 3 5 6 B: 1 3 5 6 B: 1 3 5 6 B: 1 4 5 6 B: 1 5 6 B: 1 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7

Statements about the course	: Respond to the st	atements below,	using the	follow	ing 7-poi	nt scale.		3	SIDE 2
12. Compared to other courses at the	oo sama layal (100 20	0 200 400\ the	very low	low	below average	average	above average	high	very high
work load is			1	(2)	3	4	•	6	1
the material is				2	(3)	4	(5)	6	7
15. (If applicable) The value of the to 16. (If applicable) The value of the la	itorials is	****	1	2	3	4	5	6	7
17. (If applicable) The value of the s 18. (If applicable) The value of the la	eminars is		1	2	3	4	(5) (5)	6	7
The value of the overall learning Considering your experience with	experience is		(T)	(2)	(3)	4	(5)	6	•
meet program or degree require				10	Ye	s	O No		
Statements about yourself:									
21. Number of full course credits al	ready earned (prior to	o this session): 4 15-19½	(8)	≥20					
22. Status of the course for you: ## Program Requirement	Selected from a re	quired list in a prog			eadth Reg	uirement	4	Optional	
23. Your level of enthusiasm to take 1 low medium	③ high	me of initial regis	tration:		•				
24. Your expected grade in this cou	rse: ③ 60-69	4 70-79		≥80					
Additional statements or qu	estions which m	av he sunnlie	d in clas	26:					
25. ① ② ③ ④ ⑤ ⑥ ⑦ 26. ① ② ③ ④ ⑤ ⑥ ⑦	28. 1 2 3 4 5 29. 1 2 3 4 5	6 7	31. 🕕	2 3 4	567				5 6 7 5 6 7
27. 1 2 3 4 5 6 7	30. 1 2 3 4 5				5 6 7				5 6 7
PART II: PLEASE ANSWER ONL									
on the instructor(s) or course. For a suggestions for improving the instr		•	asons for	your nu	merical ev	raluations	or provid	le specifi	С
7)		1			1.				
I loved to	MIS CO	use.		(9				
UROR'S RE	ESPONSE	55 TO	0	DE.	5/10	1/5	inst	EDF	_
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STUDENT SURVEY FORM UNIVERSITY OF TORONTO

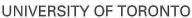




Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

	RT I: INSTRUCTIONS. PLEASE READ FIRST.							
6	Using an HB pencil or a blue or black ball-point pen (but not a f corresponding to your response for each statement. If using a pen,							ion.
J	Part II (on the reverse side) requires a written answer.							
(Course Identification: Please print course and section you are evaluate	ting						
(COURSE MATZYOHIF SECTION				INSTRU	UCTOR	(S):	
1	If evaluating only one instructor, write the name in the upper (A) box.	If evaluatin	A:	Prof.	Dror Ba	-Nata	an	
	two instructors, write their names, one in box A and the other in box I		B:					
	DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FO	ORM			W			
_								
Sta	tements about the instructor(s):							
	pond to the statements below for instructor A (and instructor B)	bearing in	n mind t	hat there	e are wide	variatio	ns in cla	ıss size
and	subject matter in Arts and Science.	1						1.
		extremely poor	very poor	poor	adequate	good	good	outstanding
2.	Communicates goals and requirements of the course clearly and explicitly.	. A: ①	(2)	(3)	(4)	(5)		7
3.	Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation	B: ①	2	(3)	4	(5) a	6	7
	of student learning.		2	(3)	4	(5)	0	7
		B: ①	(2)	3	4	5	6	1
4.	Presents material in an organized, well-planned manner	. A: ①	(2)	(3)		(5)	(6)	7
		B: ①	(2)		4		6	7
5.	Explains concepts clearly with appropriate use of examples	. A: ①	(2)	(3)	4	•	6	(7)
		B: ①	(2)	(3)	(4)		(6)	
6.	Communicates enthusiasm and interest in the course material	. A: ①	(2)	(3)	(4)		(6)	
		B: ①	(2)	3	4)	(5)	(6)	7
7.	Attends to students' questions and answers them clearly and effectively.	A: (1)	(2)	(3)	4			(7)
		B: ①	(2)		(4)		(6)	(7)
8.	Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course	A . (1)	(2)		4	(5)	(6)	
	office flours, to students with problems relating to the course	B: ①	(2)		(4)		(6)	(7)
9.	Ensures that student work is graded fairly, with helpful comments					-	-	
9.	Ensures that student work is graded fairly, with helpful comments and feedback where appropriate.	B: 1	2		4	5	6	7
	and feedback where appropriate	B: ①	2		4	5	6	7
		B: ①						7
10.	and feedback where appropriate	B: ① . A: ① . B: ①	2 2		4	(5) (5)	6	7
10.	and feedback where appropriate	B: ① . A: ① . B: ①	2		4	5	6	7
10.	and feedback where appropriate	B: ① . A: ① . A: ①	2 2		4 4 4	(5) (5) (5)	6	7

:							
Statements about the course: Respond to the statements below	, using the	follow	ing 7-poi	nt scale.		3	SIDE 2
12. Compared to other courses at the same level (100,200,300,400), the work load is	very low	low	below average	average	above average	high	very high
Compared to other courses at the same level, the level of difficulty of the material is	. ①	(2)	3	4	(5)		7
14. The value of the required reading is	. ①	2 2	(3) (3)	4	(5) (5)	6	7
16. (If applicable) The value of the laboratories is	. 1	(2)	3	. 4	(5) (5)	6	7
The value of the overall learning experience is	10 need for it	(2)	(3)	4	(5)		7
meet program or degree requirements, would you still have taken this	course?		• Ye	S	O No		
Statements about yourself: 21. Number of full course credits already earned (prior to this session): 0-41/2 25-91/2 3 10-141/2 4 15-191/2	(5)	≥20					
 Status of the course for you: Program Requirement Selected from a required list in a program required list in a progr		(3) Bi	readth Req	uirement	4	Optional	
1 low 2 medium high 24. Your expected grade in this course:	stration.						
① <50 ② 50-59 ● 60-69 ④ 70-79		≥80					
Additional statements or questions which may be supplied 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7			567		34. ①	234	567
26. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7			567				567
PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I.							
on the instructor(s) or course. For example, you may wish to give the re suggestions for improving the instruction in the course.	easons for	your nu	merical ev	aluations	or provic	le specit	ic
-more organization on the chalkboard would b	oe nice	, but	speed	n was	good	w	1
- Tutorials were pretty good, but needed t	o be a	bit 1	nore fo	cused	on cla	iss mo	teria 1
- For can the tutorial not be right after t	he clas	3 ?					
- The wiki was AMAZING. Good deed point	3 are	not	needea	, but	the		
discussion was cool			a				
e e e e e e e e e e e e e e e e e e e							
4							
*							





INSTRUCTOR(S):

A:

B:

Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection.

SECTION

Part II (on the reverse side) requires a written answer.

COURSE

Course Identification: Please print course and section you are evaluating

 If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B.

DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM

Ota	tements about the instructor(s):							
	pond to the statements below for instructor A (and instructor B) I subject matter in Arts and Science.	bearing in	n mind th	at ther	e are wide	variation	ns in cla	ıss size
		extremely poor	very poor	poor	adequate	good	very	outstanding
2.	Communicates goals and requirements of the course clearly							
	and explicitly		2	(3)	4	(5)	6	
3.	Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation	B: ①	(2)	(3)	4	(5)	6	7
	of student learning	A: ①	(2)	(3)	(4)	(5)	(6)	em e
	(F)	B: ①	(2)		(4)		(6)	7
4.	Presents material in an organized, well-planned manner	A: ①	(2)		(4)		(6)	99
		B: ①	(2)	(3)	4		6	7
5.	Explains concepts clearly with appropriate use of examples	A: ①	(2)	3	(A)		4	(7)
		B: ①	(2)	3	(4)	(5)	6	(7)
6.	Communicates enthusiasm and interest in the course material		2	(3)	4	(5)	6	@
		B: ①	(2)	(3)	4	(5)	6	(7)
1.	Attends to students' questions and answers them clearly and effectively.	A. (T)		(3)	(4)		(6)	7
	and enectivery.	B: ①			(4)		(6)	(7)
8.	Is available for individual consultation, by appointment or stated							
	office hours, to students with problems relating to the course		(2)	(3)	4		@	(7)
		B: ①	2	(3)	4	(5)		(7)
9.	Ensures that student work is graded fairly, with helpful comments	A: ①		(3)	(4)		Cas	(7)
	and feedback where appropriate	B: ①	(2)		4	(5)	6	(<u>D</u>
10	Formula that about an incident and admitted a second to the	A . (3)	(2)		(4)	(5)		
10.	Ensures that student work is graded within a reasonable time	A: 1) B: 1)	(2)		(4)		(6)	7
44	All things considered, performs effectively as a university teacher	A. (1)	(2)	(3)	(4)	(5)	(8)	(3)
of Tax	An unings considered, performs electively as a university teacher	B: ①	(2)	(3)	(4)		(6)	(7)

atements about the c	course: Res	spond to the	statements below	w, using th	e follow	ing 7-poir	nt scale.	2		SIDE
	292			very low	low	below	average	above	high	very
Compared to other cours work load is Compared to other cours				①	(2)	average (3)	*	average (5)	6	high
the material is The value of the required				①	2	(3)	4	5	6	7
(If applicable) The value	of the tutoria	ls is		O	(2)	3	(49)	(5)	6	1
(If applicable) The value (If applicable) The value	of the semina	ars is		1	2	3	4	5	6	7
(If applicable) The value of the overall leads	earning expe	rience is		①	2	3	4	(5)	63	7
 Considering your experie meet program or degree 					t to	Ye	5	O No		
atements about your	ealf.					=				
. Number of full course cr	redits already									
 0-4½ Status of the course for 	you:	3 10-141/2	4 15-19½		≥20					
Program Requirement Your level of enthusiasm	t ② Son to take this	elected from a course at the	required list in a pr	ogram istration:	3 Br	eadth Req	uirement	(4)	Optional	
① low ② m . Your expected grade in t	nedium this course:	3 high								
① <50 ② 50	0-59	③ 60-69	4 70-79	6	≥80					
lditional statements	or questio	ns which	may be suppli							
5. 1 2 3 4 5 6 7 6. 1 2 3 4 5 6 7		1234				5 6 7			234	
						5 6 7			2 3 4	
7. (1) (2) (3) (4) (5) (6) (7) RT II: PLEASE ANSWER The instructor(s) or cours ggestions for improving the structure of th	R ONLY AF se. For exam _j he instructio	ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ic
7. (1) (2) (3) (4) (5) (6) (7) RT II: PLEASE ANSWER the instructor(s) or cours ggestions for improving the	R ONLY AF se. For exam _j he instructio	TER COMP ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
T II: PLEASE ANSWER the instructor(s) or cours ggestions for improving the	R ONLY AF se. For exam _j he instructio	TER COMP ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
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T II: PLEASE ANSWER the instructor(s) or cours gestions for improving the	R ONLY AF se. For exam _j he instructio	TER COMP ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
T II: PLEASE ANSWER the instructor(s) or cours gestions for improving the	R ONLY AF se. For exam _j he instructio	TER COMP ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
T II: PLEASE ANSWER the instructor(s) or cours gestions for improving the	R ONLY AF se. For exam _j he instructio	TER COMP ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
T II: PLEASE ANSWER the instructor(s) or cours gestions for improving the	R ONLY AF se. For exam _j he instructio	TER COMP ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
T II: PLEASE ANSWER the instructor(s) or cours gestions for improving the	R ONLY AF se. For exam _j he instructio	TER COMP ple, you may on in the cour	LETING PART I wish to give the see.	I. Please us reasons for	se the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
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T II: PLEASE ANSWER the instructor(s) or cours gestions for improving the	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may on in the cour	LETING PART I wish to give the ise.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
Γ II: PLEASE ANSWER the instructor(s) or cours gestions for improving the	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING	LETING PART I wish to give the see.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours gestions for improving the the homework the material	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING	LETING PART I wish to give the ise.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours gestions for improving the the homework the marterial	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING	LETING PART I wish to give the see.	I. Please us reasons for	te the spa your nu	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours ggestions for improving the the homewore the material	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING	LETING PART I wish to give the see.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours ggestions for improving the the homewore the material	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING	LETING PART I wish to give the see.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours ggestions for improving the the homewore the material	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING Like fra	LETING PART I wish to give the see.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours ggestions for improving the the homewore the material	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING Like fra	LETING PART I wish to give the see.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours ggestions for improving the the homewore the material	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING Like fra	LETING PART I wish to give the see.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc
TII: PLEASE ANSWEI the instructor(s) or cours ggestions for improving the the homewore the material	R ONLY AF se. For example instruction or for the do	TER COMP ple, you may in the cour SSEGNING Like fra	LETING PART I wish to give the see.	I. Please us reasons for	tives	nce below merical ev	aluations	e supplen or provid	nentary (ìc

STUDENT SURVEY FORM UNIVERSITY OF TORONTO





Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS, PLEASE READ FIRST. Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection. Part II (on the reverse side) requires a written answer. Course Identification: Please print course and section you are evaluating **COURSE SECTION** INSTRUCTOR(S): A: 1. If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B. B: DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM Statements about the instructor(s): Respond to the statements below for instructor A (and instructor B) bearing in mind that there are wide variations in class size and subject matter in Arts and Science. outstanding extremely adequate good very poor very poor 2. Communicates goals and requirements of the course clearly and explicitly. A: 3. Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation of student learning. 4. Presents material in an organized, well-planned manner. A: 5. Explains concepts clearly with appropriate use of examples. A: (1 B: (1 6. Communicates enthusiasm and interest in the course material. A: (1 7. Attends to students' questions and answers them clearly 8. Is available for individual consultation, by appointment or stated office hours, to students with problems relating to the course. . . . 9. Ensures that student work is graded fairly, with helpful comments B: 1 A: 1 10. Ensures that student work is graded within a reasonable time.

PART I CONTINUES ON THE REVERSE SIDE

A: 1

11. All things considered, performs effectively as a university teacher. ...

•	
Statements about the course: Respond to the statements below, using the following 7-point scale.	SIDE 2
	above high very high 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7
Statements about yourself: 21. Number of full course credits already earned (prior to this session):	④ Optional
Additional statements or questions which may be supplied in class: 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 33. 1 2 3 4 5 6 7	34. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7
PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. Please use the space below to provide a on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations of suggestions for improving the instruction in the course. - great Professor, good enthusiasm, brings enthusiasm in strelents - great examples in class - good orderloganization. - a little down to start shod torosh at the end of the	or provide specific

UNIVERSITY OF TORONTO



INSTRUCTOR(S):

Bar-Natan

A:

B:

Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS. PLEASE READ FIRST.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection.

SECTION

Part II (on the reverse side) requires a written answer.

COURSE

Course Identification: Please print course and section you are evaluating

 If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B.

DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FORM

Sta	tements about the instructor(s):								
Res	pond to the statements below for instructor A (and instructor B)	bear	ing in	mind t	hat there	e are wide	variation	ıs in cla	ıss size
and	subject matter in Arts and Science.								
			mely oor	very poor	poor	adequate	good	very	outstanding
2.	Communicates goals and requirements of the course clearly	21 4 77 m							
	and explicitly			(2)	(3)	4	(5)	(6)	
3.	Uses methods of evaluation (e.g. papers, assignments, tests) that appropriately reflect the subject matter and provide a fair evaluation	B: (D	2	3	4	(5)	6	7
	of student learning.	Δ.	D	(2)	(3)	(4)			(7)
	of student featuring.	B: ((2)	(3)	4	(5)	(6)	= ①
4.	Presents material in an organized, well-planned manner	A: (1)	(2)		(4)	(5)	(6)	
	,	B: ((2)		4		(6)	7
5.	Explains concepts clearly with appropriate use of examples			2		(4)	(5)	6	
		B: (D	(2)	(3)	(4)	(5)	(6)	(7)
6.	Communicates enthusiasm and interest in the course material	A: (D		(3)	(4)	(5)	(6)	•
-	And the Analysis of the Analys	B: (1)	(2)	(3)	4	(5)	6	(7)
7.	Attends to students' questions and answers them clearly and effectively.	A: (1)	(2)		4	(5)	-	(7)
	did onodivory.	B: ((2)		4		6	7
8.	Is available for individual consultation, by appointment or stated							2440	
	office hours, to students with problems relating to the course			(2)	(3)	4		6	7
Q	Ensures that student work is graded fairly, with helpful comments	B: (1)	(2)	(3)	(4)	(5)	(6)	0
٥.	and feedback where appropriate	A: (D	(2)	(3)	400		(6)	(7)
	erialis establication escoloriscoco escoloriscoco escoloriscoco escoloriscoco de constantico de constantico de	B: ((2)	(3)	4		6	(7)
10.	Ensures that student work is graded within a reasonable time	A: (D	(2)	(3)	4	(5)	(6)	
		B: (2		4		6	7
11.	All things considered, performs effectively as a university teacher	A: (D	2	3	4	(5)	6	
		B: ((2)		(4)		(6)	7

tatements about the co	ourse: Res	pond to the	statements below	, using t	he follov	ving 7-poi	nt scale.		9	SIDE 2
				very low		below	average	above	high	very high
2. Compared to other course	s at the sar	ne level (100,	200,300,400), the	(f)	2	average	CAD)	average		
work load is 3. Compared to other course	es at the sar	ne level, the l	evel of difficulty of		(2)	(3)	(4)	(5)		7
the material is				. (1)	2	3	4	(5)		7
4. The value of the required to (if applicable) The value of	reading is . f the tutoria	ls is		. (1)	2	3	4	5	6	7
(If applicable) The value of	f the laborat	tories is		. 1	2	3	4	(5)	6	7
7. (If applicable) The value of 8. (If applicable) The value of	r the semina f the langua	ars is ige conversat	ion classes is	. ①	2	3	4	5	6	7
The value of the overall le	arning expe	rience is		(1)	(2)	(3)	4	(5)	6	
 Considering your experient meet program or degree re 						Ye	S	O No		
tatements about yours										
 Number of full course cre 0-4½ 5-9 	1/2	earned (prior 3) 10-141/2	r to this session): 4 15-19½	G) ≥20					
Status of the course for y Program Requirement		elected from a	required list in a pro	ogram	(3) E	readth Req	uirement	(4)	Optional	
3. Your level of enthusiasm	to take this	course at the								
1 low 2 me 4. Your expected grade in the		high								
<u>(1)</u> <50 <u>(2)</u> 50-	59	3 60-69	70-79		08≤ (
25. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7	28. 29.	1234	(5) (6) (7)	31. <u>(</u> 32. <u>(</u>	230	567		35. 🕦	2 3 4	5 6
	28. 29.	1234	5 6 7 5 6 7	31. <u>(</u> 32. <u>(</u>	230			35. 🕦	2 3 4	5 6 0
26. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 RT II: PLEASE ANSWER	28. 29. 30. ONLY AF	1 2 3 4 1 2 3 4 1 2 3 4 TER COMP	5 6 7 5 6 7 5 6 7 LETING PART I	31. 32. 33. 33. 9	2 3 0 2 3 0 2 3 0	5 6 7 5 6 7 Pace below	to provid	35. ① 36. ① e supplem	2 3 4 2 3 4 nentary o	commen
26. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7	28 29 30 ONLY AF	TER COMP.	LETING PART I	31. 32. 33. 33. 9	2 3 0 2 3 0 2 3 0	5 6 7 5 6 7 Pace below	to provid	35. ① 36. ① e supplem	2 3 4 2 3 4 nentary o	0 5 6 7 5 6 7
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY are example instruction	TER COMP	LETING PART I wish to give the rese.	31. 32. 33. 33 Please ueasons fo	2 3 (2 3 (2 3 (3) 2 3 (3) (2) 3 (3) (3)	ace below imerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	0 5 6 7 5 6 7
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY are example instruction	TER COMP	LETING PART I wish to give the rese.	31. 32. 33. 33 Please ueasons fo	2 3 (2 3 (2 3 (3) 2 3 (3) (2) 3 (3) (3)	ace below imerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY are example instruction	TER COMP	LETING PART I wish to give the rese.	31. 32. 33. 33 Please ueasons fo	2 3 (2 3 (2 3 (3) 2 3 (3) (2) 3 (3) (3)	ace below imerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	0 5 6 7 5 6 7
P.C. 1 2 3 4 5 6 7 P.T. 1 2 3 4 5 6 7 RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction	TER COMP ple, you may n in the cour	LETING PART I wish to give the rese.	31. 32. 33. 33. Please ueasons for	use the spor your no	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	0 5 6 7 5 6 7
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P.E. 1 2 3 4 5 6 7 P.T. 1 2 3 4 5 6 7 RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction Offels Course	TER COMP ple, you may n in the cour	LETING PART I wish to give the rese.	31. 32. 33. Please ueasons for	use the spor your no	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	commen
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction Offels Course	TER COMP ple, you may n in the cour	LETING PART I wish to give the rese.	31. 32. 33. Please ueasons for	use the spor your no	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	ommen
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction Offels Course	TER COMP ple, you may n in the cour were halpful required	LETING PART I wish to give the rese. Proporty to make A	31. 32. 33. 33. Please u easons fo	ase the spor your not	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	0 5 6 7 5 6 7
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction of all s course ki was all be	TER COMP ple, you may n in the cour were halpful required	LETING PART I wish to give the rese. Proporty to make A	31. 32. 33. 33. Please u easons fo	ase the spor your not	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	ommen
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction Offels Course	TER COMP ple, you may n in the cour were halpful required	LETING PART I wish to give the rese.	31. 32. 33. 33. Please u easons fo	ase the spor your not	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	ommen
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction of all s course ki was all be	TER COMP ple, you may n in the cour were halpful required	LETING PART I wish to give the rese. Proporty to make A	31. 32. 33. 33. Please u easons fo	ase the spor your not	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	ommen
RT II: PLEASE ANSWER In the instructor(s) or course aggestions for improving the	ONLY AF ONLY AF For example instruction of all s course ki was all be	TER COMP ple, you may n in the cour were halpful required	LETING PART I wish to give the rese. Proporty to make A	31. 32. 33. 33. Please u easons fo	ase the spor your not	ace below umerical ev	to provid aluations	35. ① 36. ①	2 3 4 2 3 4 nentary c	commen
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UNIVERSITY OF TORONTO



Bor - Watan

A:

B:

Note that survey results will be available to the instructor(s) only after final course marks have been submitted.

PART I: INSTRUCTIONS, PLEASE READ FIRST.

Using an HB pencil or a blue or black ball-point pen (but not a felt marking pen), fill completely the numbered oval corresponding to your response for each statement. If using a pen, do not alter original response by making another selection.

SECTION

Part II (on the reverse side) requires a written answer.

COURSE

Course Identification: Please print course and section you are evaluating

 If evaluating only one instructor, write the name in the upper (A) box. If evaluating two instructors, write their names, one in box A and the other in box B.

	DO NOT EVALUATE TEACHING ASSISTANTS ON THIS FO	RM					\$9		
Sta	tements about the instructor(s):								
Res	pond to the statements below for instructor A (and instructor B)	hear	ing in	mind t	hat ther	e are wide	variatio	ns in cla	iss size
	subject matter in Arts and Science.	БСШ		· mmc ·	aut ther	cure wide	variatio.	us III eie	EGG GIZZE
anne	Subject matter in this and Science.								
			emely	very	poor	adequate	good	very	outstanding
2	Communicates goals and requirements of the course clearly	Р	oor	poor				good	
	and explicitly.	. A: (1)	(2)	(3)	4	(5)	6	0
		B: ((2)	3	4	5	6	(7)
3.	Uses methods of evaluation (e.g. papers, assignments, tests) that								
	appropriately reflect the subject matter and provide a fair evaluation	A			rav.	450	(F)		(7)
	of student learning.	B:		(2)	(3)	(4)	(5)	6	7
		D .		(E)	(9)				
4.	Presents material in an organized, well-planned manner	A:	1)	(2)	(3)	(4)	(5)	6	0
		B: ((2)		(4)	(5)	6	(7)
5	Explains concepts clearly with appropriate use of examples	Λ.	1)	(2)	(3)	4		(6)	(E)
J.	Explains concepts clearly with appropriate use of examples	B:		(2)	(3)	(4)	(5)	(6)	(7)
6.	Communicates enthusiasm and interest in the course material	B:				4	(5)	6	7
7	Attends to students' questions and answers them clearly	О.		(6)	(3)	(4)	(3)		
	and effectively.	. A:	1)	(2)		(4)		6	· ·
		B:		(2)	(3)	4	(5)	6	7
8.	Is available for individual consultation, by appointment or stated	30							
	office hours, to students with problems relating to the course			(2)	(3)	4		(6)	(7)
0	Ensures that student work is graded fairly, with helpful comments	B:		(8)	(3)	(4)		(6)	
Э.	and feedback where appropriate.	. A:	1)	(2)	-	(4)	(5)	(6)	(7)
	and recommend appropriate the second	B:		(2)	(3)	(4)	(5)	(6)	7
10	Ensures that student work is graded within a reasonable time	. A:	7		(3)	(4)	distr	(6)	7
10.	Lindures that student work is graded within a reasonable tille	B:		(2)		4	(5)	6	7
11.	All things considered, performs effectively as a university teacher	. A:	1)	(2)		4		6	98

Statements about the course: Respond to the statements below, using the following 7-point scale. SIDE 2 12. Compared to other courses at the same level (100,200,300,400), the work load is	· ·						
12. Compared to other courses at the same level (100,200,300,400), the work load is	Statements about the course: Respond to the statements below, using th	e follow	ving 7-poi	nt scale.		3	SIDE 2
work load is		low		average		high	very high
the material is	work load is ①	(2)		4			
15. (If applicable) The value of the tutorials is		(2)	3	4	(5)		7
16. (if applicable) The value of the laboratories is							
18. (if applicable) The value of the language conversation classes is	16. (If applicable) The value of the laboratories is	2	(3)	4	(5)	6	7
20. Considering your experience with this course, and disregarding your need for it to meet program or degree requirements, would you still have taken this course? Yes No Statements about yourself: 21. Number of full course credits already earned (prior to this session): 0.04½ 2.59½ 3.10-14½ 15-19½ 5.20 22. Status of the course for you: 1 Program Requirement 2 Selected from a required list in a program 23. Your level of enthusiasm to take this course at the time of initial registration: 1 low 2 medium high 1 your expected grade in this course: 1 <50 2.50-59 60-69 4.70-79 5.280 Additional statements or questions which may be supplied in class: 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 3 36. 1 2 3 4 5 6 7 3 36. 1 2 3 4 5 6 7 3 36. 1 2 3	18. (If applicable) The value of the language conversation classes is	(2)	(3)	(4)		6	(7)
Statements about yourself: 21. Number of full course credits already earned (prior to this session): \$\insert{0.4\frac{1}{2}}\$ \frac{1}{2} \frac{1}{	20. Considering your experience with this course, and disregarding your need for it						(1)
21. Number of full course credits already earned (prior to this session): 0 - 4/½ 22. Status of the course for you: 1 Program Requirement 2 Selected from a required list in a program 23. Your level of enthusiasm to take this course at the time of initial registration: 1 low 2 medium 2 high 24. Your expected grade in this course: 1 <50 2 50-59 60-69 4 70-79 5 ≥ 80 Additional statements or questions which may be supplied in class: 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1	meet program or degree requirements, would you still have taken this course?		Ye	S	Q No	ļ 	
25. 12 3 4 5 6 7 28. 12 3 4 5 6 7 28. 12 3 4 5 6 7 32. 12 3 4 5 6 7 32. 12 3 4 5 6 7 32. 12 3 4 5 6 7 30. 12 3 4 5 6 7 32. 12 3 4 5 6 7 30. 12 3 4 5 6 7 32. 12							
22. Status of the course for you: 1 Program Requirement 2 Selected from a required list in a program 3 Breadth Requirement Optional 23. Your level of enthusiasm to take this course at the time of initial registration: 1 low 2 medium high Norrespected grade in this course: 1 <50 2 50-59 60-69 4 70-79 5 ≥80 Additional statements or questions which may be supplied in class: 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4		> 20					
23. Your level of enthusiasm to take this course at the time of initial registration: low	22. Status of the course for you:) voodth Dan			Ontional	
24. Your expected grade in this course: <50	23. Your level of enthusiasm to take this course at the time of initial registration:	(a) E	reaum neq	uirement		Optional	
Additional statements or questions which may be supplied in class: 25. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 34. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 20. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 20. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 20. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 21. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 22. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 23. 1 2 3 4 5 6 7 24. 1 2 3 4 5 6 7 25. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 3	24. Your expected grade in this course:						
25. 1 2 3 4 5 6 7 26. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 35. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4	① <50 ② 50-59 ⑩ 60-69 ④ 70-79 ⑤	≥80					1
26. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 27. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 28. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 29. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 31. 1 2 3 4 5 6 7 32. 1 2 3 4 5 6 7 36. 1 2 3 4 5 6 7 37. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 38. 1 2 3 4 5 6 7 39. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 30. 1 2 3 4 5 6 7 3	Additional statements or questions which may be supplied in cla	ss:					
PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. Please use the space below to provide supplementary comments on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations or provide specific suggestions for improving the instruction in the course. Bor Nator is the most affective professor of hour had. It is unfortunate that the completely useless defineds damaged my experience is the course (for they were greatly							
on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations or provide specific suggestions for improving the instruction in the course. Bor Nator is the most affanin professor I have had. It is unforward that the completely useless delived devices delived and appearing in the course of the start were greatly							
on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations or provide specific suggestions for improving the instruction in the course. Bor Nator is the most affanin professor I have had. It is unforward that the completely useless delived devices delived and appearing in the course of the start were greatly	PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I. Please us	e the sp	ace below	to provid	le supplen	nentary o	comments
Bor. Notes is the most afforming professor & house had. It is unfortunate that the completely useless ditarials domained my experience in this course (for they were greatly	on the instructor(s) or course. For example, you may wish to give the reasons for						
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domaged my experience in thes course (for ohis was greatly	Tor Note 12 ms was stocker	pro	kaser	H	ngus	naa	
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						82	

Faculty of Arts & Science University of Toronto Survey Summary Results: FALL, 2006

MAT 240H1F Course: L0101 Section:

Enrolment:

76

Number of Forms Scanned: 45

Instructor: D. BAR-NATAN

STATEMENTS ABOUT THE INSTRUCTOR:

STATEMENTS ABOUT THE COURSE:

Quest.	상	Res	o. t	o Sc	ale	Rati	ng	No.	Mean	Quest	. %	Res	p. t	o Sc	ale	Rati	ng	No.	Mean
	1	2	3	4	5	6	7				1	2	3	4	5	6	7		
2.	0	0	0	4	8	26	60	45	6.4	12.	0	0	0	46	37	11	4	45	4.7
3.	0	0	2	13	13	40	31	45	5.8	13.	0	0	2	33	33	24	6	45	5.0
4.	0	0	0	8	2	28	60	45	6.4	14.	2	6	4	20	32	20	11	43	4.8
5.	0	0	0	6	11	27	54	44	6.3	15.	21	26	11	21	2	11	4	42	3.1
6.	0	0	0	4	2	20	73	45	6.6	16.	25	0	0	50	25	0	0	4	3.5
7.	0	0	0	8	4	35	51	45	6.3	17.	0	0	0	40	0	40	20	5	5.4
8.	0	0	0	11	15	27	45	44	6.1	18.	0	0	7	28	14	42	7	14	5.1
9.	0	0	4	15	17	35	26	45	5.6	19.	0	0	2	16	16	32	32	37	5.8
10.	0	0	0	2	24	26	46	45	6.2										
11.	0	0	0	4	2	27	65	44	6.5	20.	Ye	s:	87%	No	: 1	2%		40	

OTHER QUESTIONS:

Quest.	ક	% Resp		Sca	ale	Rating		No.	Mean	Quest.	왕	Res	Resp. to		ale	Ratin	ng	No.	Mean
	1	2	3	4	5	6	7				1	2	3	4	5	6	7		
25.	0	0	0	0	0	0	0	0	0.0	31.	0	0	0	0	0	0	0	0	0.0
26.	0	0	0	0	0	0	0	0	0.0	32.	0	0	0	0	0	0	0	0	0.0
27.	0	0	0	0	0	0	0	0	0.0	33.	0	0	0	0	0	0	0	0	0.0
28.	0	0	0	0	0	0	0	0	0.0	34.	0	0	0	0	0	0	0	0	0.0
29.	0	0	0	0	0	0	0	0	0.0	35.	0	0	0	0	0	0	0	0	0.0
30.	0	0	0	0	0	0	0	0	0.0	36.	0	0	0	0	0	0	0	0	0.0

MEAN RATING ON QUESTION 11 (GLOBAL EVALUATION OF INSTRUCTOR) AS A FUNCTION OF STUDENT INFORMATION:

OF BIC	DENI INFORMATION:		
		No.	Mean Global Eval.
21.	Number of full courses already completed:		
			1341 1040
	0-4.5	27	6.4
	5- 9.5	9	6.9
	10-14.5	4	7.0
	15-19.5	1	6.0
	>=20	1	6.0
22.	Status of the course for the student:		
	Program Requirement	30	6.4
	Selected from a required list in a program	5	6.6
	Breadth requirement	0	=
	Optional	5	7.0
23.	Initial enthusiasm to take course:		
	34		
	low	2	6.5
	medium	15	6.6
	high	25	6.5
24.	Expected grade in course:		
	<50	0	a
	50-59	2	6.0
	60-69	6	6.7
	70-79	10	6.4
	80-89	24	6.6
	>=90	0	-
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