

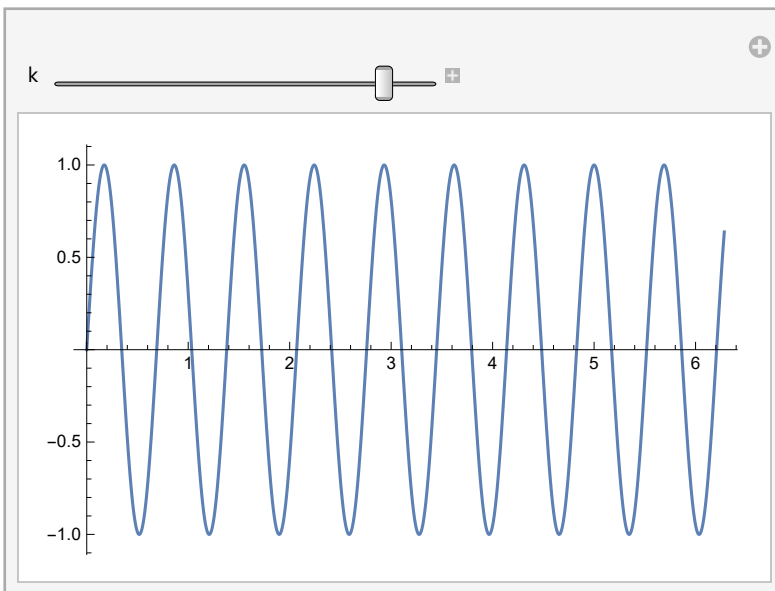
Pensieve header: January 27: Textbook (EIWL) chapters 9-12, evaluated.

9. Interactive Manipulation

`Manipulate[Table[Orange, n], {n, 1, 5, 1}]`



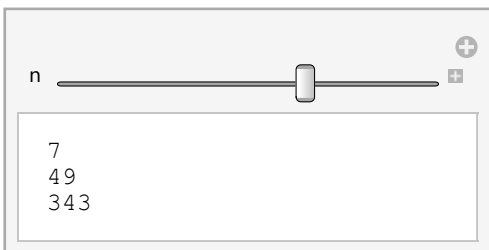
`Manipulate[Plot[Sin[k x], {x, 0, 2 π}], {k, 1, 10}]`



`Table[Table[Orange, n], {n, 1, 5, 1}]`

`{{}, {■}, {■, ■}, {■, ■, ■}, {■, ■, ■, ■}, {■, ■, ■, ■, ■}}`

`Manipulate[Column[{n, n^2, n^3}], {n, 1, 10, 1}]`

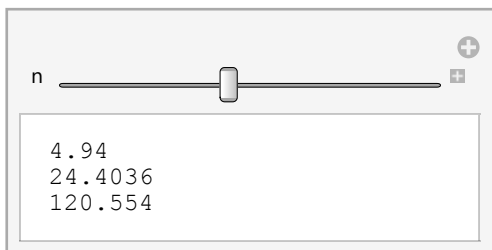


`Table[Column[{n, n^2, n^3}], {n, 1, 10, 1}]`

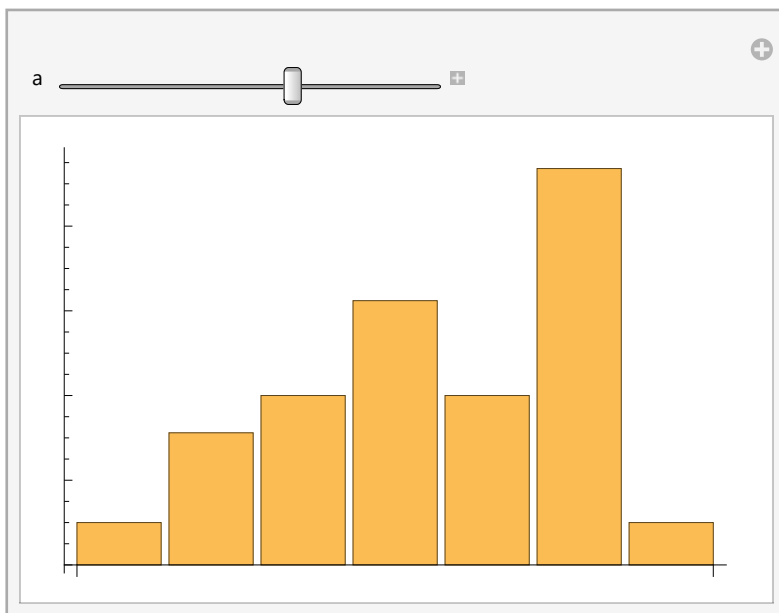
```

1  2  3  4  5  6  7  8  9  10
{ 1, 4, 9, 16, 25, 36, 49, 64, 81, 100 }
1  8  27 64 125 216 343 512 729 1000
    
```

```
Manipulate[Column[{n, n^2, n^3}], {n, 1, 10}]
```

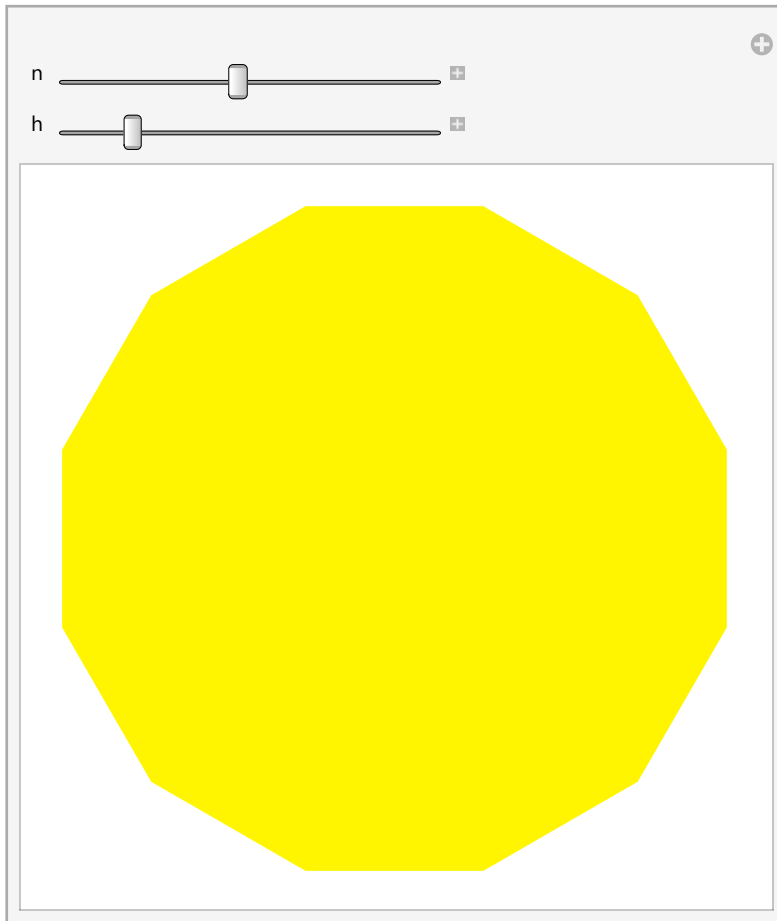


```
Manipulate[BarChart[{1, a, 4, 2 * a, 4, 3 * a, 1}], {a, 0, 5}]
```



```
Manipulate[PieChart[{1, a, 4, 2 * a, 4, 3 * a, 1}], {a, 0, 5}]
```

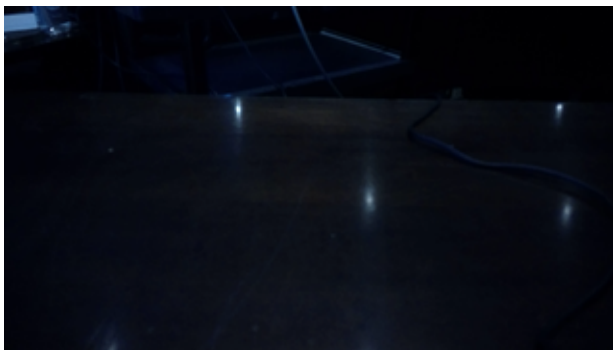
```
Manipulate[Graphics[Style[RegularPolygon[n], Hue[h]]], {n, 5, 20, 1}, {h, 0, 1}]
```



```
Manipulate[Graphics[Style[RegularPolygon[5], color]], {color, {Red, Yellow, Blue}}]
```

10. Images

```
CurrentImage[]
```



```
$ImagingDevices
```

```
{Microsoft Camera Rear, Microsoft Camera Front}
```

```
$ImagingDevice = $ImagingDevices[[2]]
```

```
Microsoft Camera Front
```

```
img = CurrentImage[]
```



```
img =
```



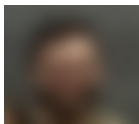
```
ColorNegate[img]
```



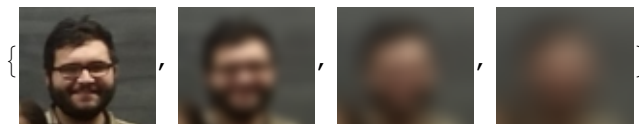
```
Blur[img]
```



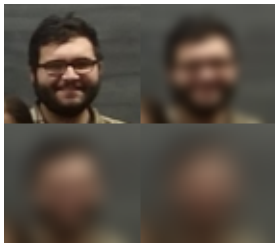
```
Blur[img, 10]
```



```
Table[Blur[img, n], {n, 0, 15, 5}]
```



```
ImageCollage[Table[Blur[img, n], {n, 0, 15, 5}]]
```



```
img // ImageDimensions
```

```
{71, 62}
```

```
DominantColors[img, 7]
```

```
{█, █, █, █, █, █, █}
```

```
Binarize[img]
```



```
DominantColors[Binarize[img]]
```

```
{█, □}
```

```
img1 = EdgeDetect[img]
```



```
ImageAdd[img, img1]
```



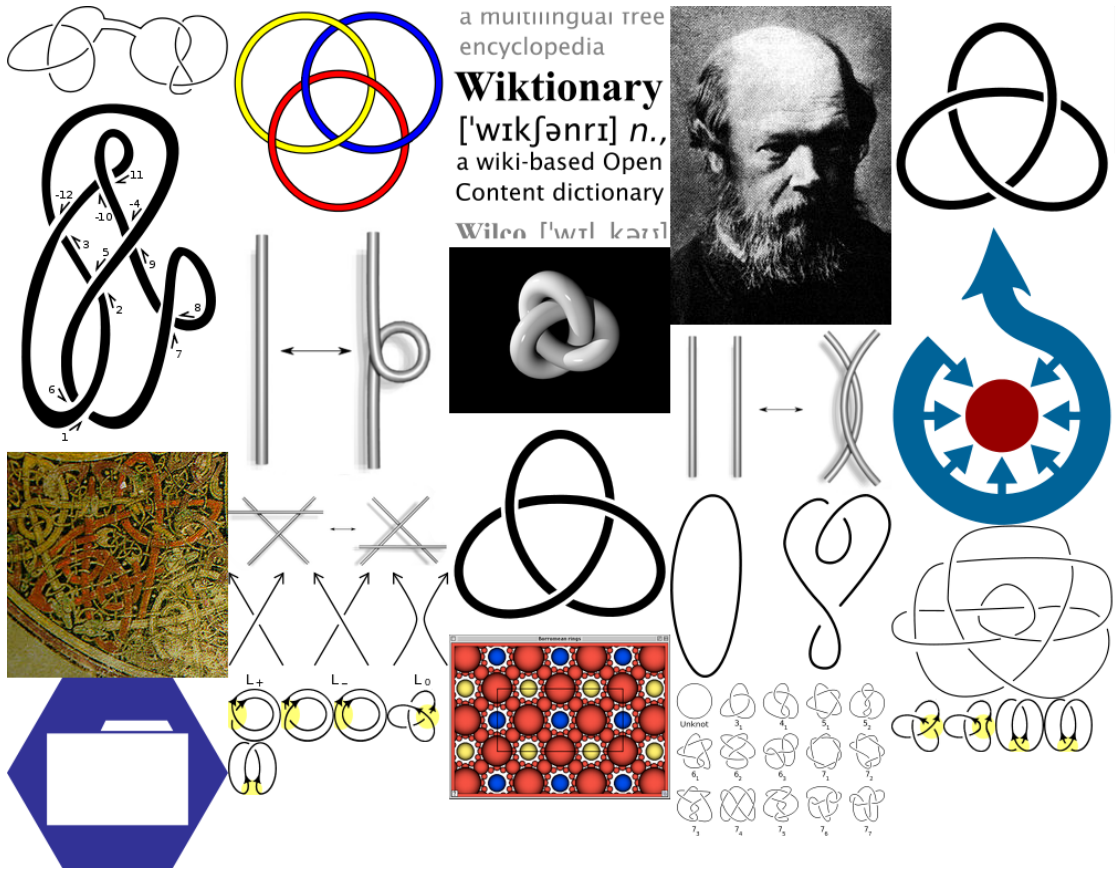
```
Manipulate[Binarize[img, t], {t, 0, 1}]
```

t

```
Binarize[img, 0.091]
```



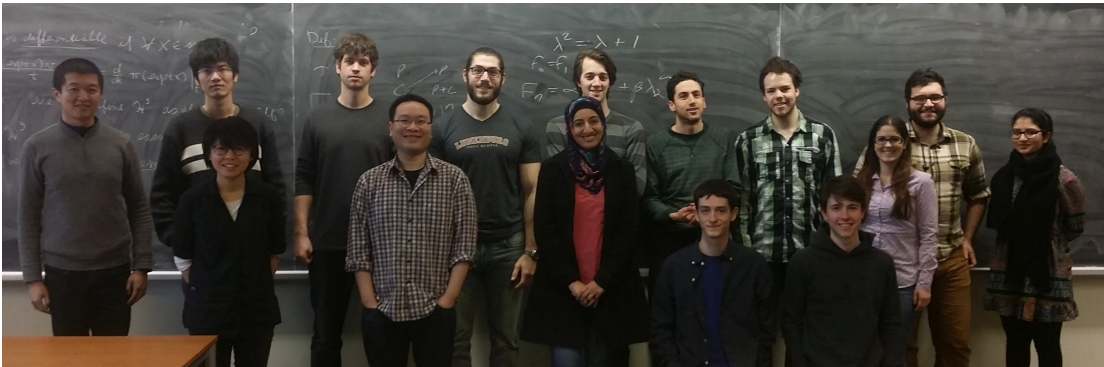
ImageCollage[Scaled[1] -> imgs, Method -> "ClosestPacking", Background -> White]



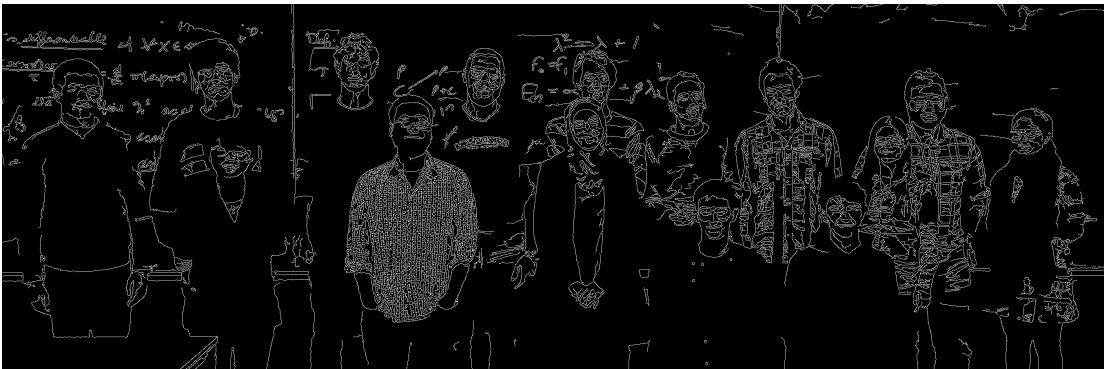
WikipediaData["Dror", "ImageList"]



```
cf = Import[
  "http://drorbn.net/AcademicPensieve/Classes/16-1750-ShamelessMathematica/
  ClassPhoto.jpg"]
```



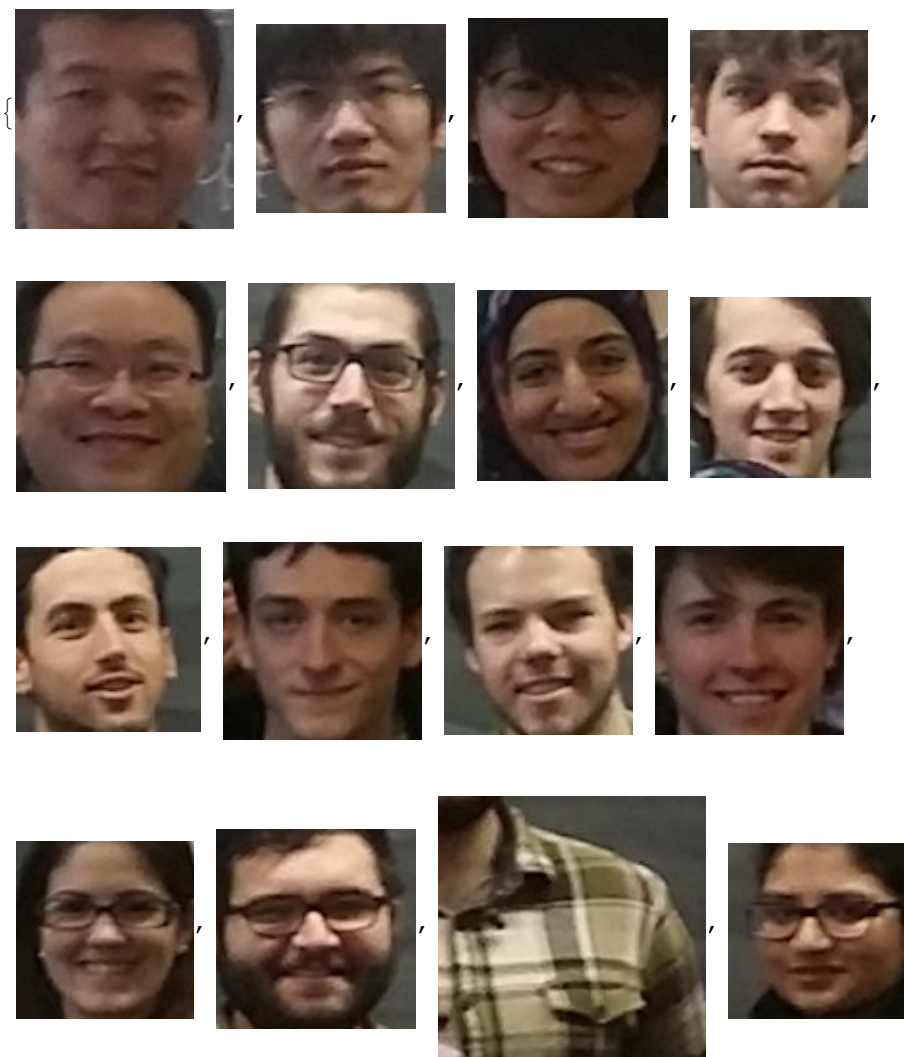
```
EdgeDetect[cf]
```



```
faces = FindFaces[cf]
```

```
{{{141.5, 618.5}, {254.5, 731.5}}, {{476.5, 672.5}, {573.5, 769.5}},
 {{507.5, 474.5}, {610.5, 577.5}}, {{822.5, 696.5}, {913.5, 787.5}},
 {{953.5, 545.5}, {1061.5, 653.5}}, {{1131.5, 666.5}, {1237.5, 772.5}},
 {{1384.5, 546.5}, {1482.5, 644.5}}, {{1409.5, 661.5}, {1502.5, 754.5}},
 {{1642.5, 614.5}, {1737.5, 709.5}}, {{1693.5, 327.5}, {1795.5, 429.5}},
 {{1855.5, 626.5}, {1952.5, 723.5}}, {{2018.5, 336.5}, {2115.5, 433.5}},
 {{2126.5, 507.5}, {2217.5, 598.5}}, {{2220.5, 603.5}, {2323.5, 706.5}},
 {{2266.5, 472.5}, {2404.5, 610.5}}, {{2460.5, 526.5}, {2550.5, 616.5}}}
```


`ImageTrim[cf, #] & /@ faces`



II. Strings and Text

```
"This is a string."
```

```
This is a string.
```

```
StringLength["hello"]
```

```
5
```

```
StringReverse["hello"]
```

```
olleh
```

```
StringRotateLeft["Lennart", 2]
```

```
nnartLe
```

```

ToUpperCase["I'm coding in the Wolfram Language!"]
I'M CODING IN THE WOLFRAM LANGUAGE!

StringTake["this is about strings", 10]
this is ab

StringLength[StringTake["this is about strings", 10]]
10

StringJoin["Hello", " ", "there!", " How are you?"]
Hello there! How are you?

{"apple", "banana", "strawberry"}
{apple, banana, strawberry}

StringTake["apple", "banana", "strawberry"], 2]
{ap, ba, st}

StringJoin["apple", "banana", "strawberry"]

Characters["a string is made of characters"]
{a, , s, t, r, i, n, g, , i, s, , m, a, d, e, , o, f, , c, h, a, r, a, c, t, e, r, s}

Sort[Characters["a string of characters"]]
{ , , , a, a, a, c, c, e, f, g, h, i, n, o, r, r, r, s, s, t, t}

Union[Characters["a string of characters"]]
{ , a, c, e, f, g, h, i, n, o, r, s, t}

InputForm[Sort[Characters["a string of characters"]]]
{" ", " ", " ", "a", "a", "a", "c", "c", "e",
 "f", "g", "h", "i", "n", "o", "r", "r", "r",
 "s", "s", "t", "t"}

TextWords["This is a sentence. Sentences are made of words."]
{This, is, a, sentence, Sentences, are, made, of, words}

StringLength[TextWords["This is a sentence. Sentences are made of words."]]
{4, 2, 1, 8, 9, 3, 4, 2, 5}

StringTake[WikipediaData["knot theory"], 100]
In topology, knot theory is the study of
  mathematical knots. While inspired by knots which appear in

```



```
WordCloud[StringTake[WordList[], 1]]
```



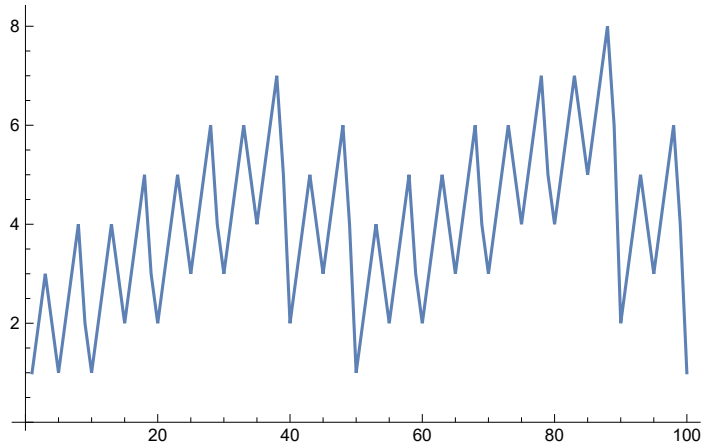
```
RomanNumeral[1988]
```

MCMLXXXVIII

```
Table[RomanNumeral[n], {n, 20}]
```

{I, II, III, IV, V, VI, VII, VIII, IX, X,
XI, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX}

```
ListLinePlot[Table[StringLength[RomanNumeral[n]], {n, 100}]]
```



```
IntegerName[56]
```

fifty-six

```
ListLinePlot[Table[StringLength[IntegerName[n]], {n, 100}]]
```

```
Alphabet[]
```

```
LetterNumber[{"a", "b", "x", "y", "z"}]
```

```
FromLetterNumber[{10, 11, 12, 13, 14, 15}]
```

```
Alphabet["Russian"]
```

```
{а, б, в, г, д, е, ё, ж, з, и, й, к, л, м,  
н, о, п, р, с, т, у, ф, х, ц, ч, ш, щ, ъ, ы, ь, э, ю, я}
```

```
Rasterize[Style["ABC", 100]]
```

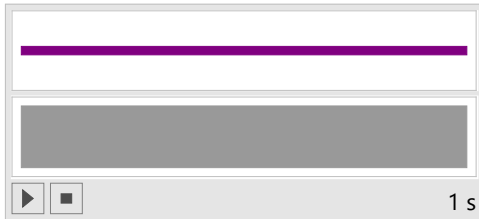
A large, bold, black serif font showing the letters 'A', 'B', and 'C' in a row.

```
EdgeDetect[Rasterize[Style["ABC", 100]]]
```

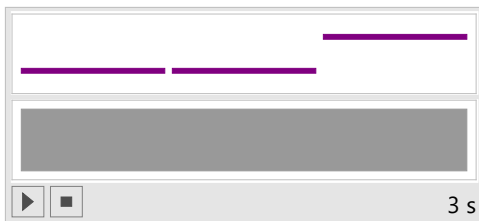


12. Sound

```
Sound[SoundNote["C"]]
```



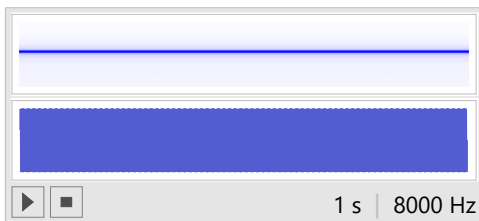
```
Sound[{SoundNote["C"], SoundNote["C"], SoundNote["G"]}]
```



```
Sound[Table[SoundNote[RandomInteger[12], 0.25, "Violin"], 20]]
```



```
Play[Sin[440 × 2 Pi t], {t, 0, 1}]
```



```
Manipulate[
  {ef, Play[Sin[ef 2 Pi t], {t, 0, 3}, SampleRate → 100 000]},
  {{f, Log@440}, Log@10, Log@30 000}
]
```

A 48-crossing knot

$K = Xp[4, 88, 5, 87] Xp[5, 75, 6, 74] Xp[6, 62, 7, 61] Xp[7, 49, 8, 48]$
 $Xp[8, 36, 9, 35] Xp[9, 23, 10, 22] Xp[16, 4, 17, 3] Xp[17, 87, 18, 86]$
 $Xp[18, 74, 19, 73] Xp[19, 61, 20, 60] Xp[20, 48, 21, 47] Xp[21, 35, 22, 34]$
 $Xp[28, 16, 29, 15] Xp[29, 3, 30, 2] Xp[30, 86, 31, 85] Xp[31, 73, 32, 72]$
 $Xp[32, 60, 33, 59] Xp[33, 47, 34, 46] Xp[40, 28, 41, 27] Xp[41, 15, 42, 14]$
 $Xp[42, 2, 43, 1] Xp[43, 85, 44, 84] Xp[44, 72, 45, 71] Xp[45, 59, 46, 58]$
 $Xp[52, 40, 53, 39] Xp[53, 27, 54, 26] Xp[54, 14, 55, 13] Xp[55, 1, 56, 96]$
 $Xp[56, 84, 57, 83] Xp[57, 71, 58, 70] Xp[64, 52, 65, 51] Xp[65, 39, 66, 38]$
 $Xp[66, 26, 67, 25] Xp[67, 13, 68, 12] Xp[68, 96, 69, 95] Xp[69, 83, 70, 82]$
 $Xp[76, 64, 77, 63] Xp[77, 51, 78, 50] Xp[78, 38, 79, 37] Xp[79, 25, 80, 24]$
 $Xp[80, 12, 81, 11] Xp[81, 95, 82, 94] Xp[88, 76, 89, 75] Xp[89, 63, 90, 62]$
 $Xp[90, 50, 91, 49] Xp[91, 37, 92, 36] Xp[92, 24, 93, 23] Xp[93, 11, 94, 10]$

$Xp[4, 88, 5, 87] Xp[5, 75, 6, 74] Xp[6, 62, 7, 61] Xp[7, 49, 8, 48]$
 $Xp[8, 36, 9, 35] Xp[9, 23, 10, 22] Xp[16, 4, 17, 3] Xp[17, 87, 18, 86]$
 $Xp[18, 74, 19, 73] Xp[19, 61, 20, 60] Xp[20, 48, 21, 47] Xp[21, 35, 22, 34]$
 $Xp[28, 16, 29, 15] Xp[29, 3, 30, 2] Xp[30, 86, 31, 85] Xp[31, 73, 32, 72]$
 $Xp[32, 60, 33, 59] Xp[33, 47, 34, 46] Xp[40, 28, 41, 27] Xp[41, 15, 42, 14]$
 $Xp[42, 2, 43, 1] Xp[43, 85, 44, 84] Xp[44, 72, 45, 71] Xp[45, 59, 46, 58]$
 $Xp[52, 40, 53, 39] Xp[53, 27, 54, 26] Xp[54, 14, 55, 13] Xp[55, 1, 56, 96]$
 $Xp[56, 84, 57, 83] Xp[57, 71, 58, 70] Xp[64, 52, 65, 51] Xp[65, 39, 66, 38]$
 $Xp[66, 26, 67, 25] Xp[67, 13, 68, 12] Xp[68, 96, 69, 95] Xp[69, 83, 70, 82]$
 $Xp[76, 64, 77, 63] Xp[77, 51, 78, 50] Xp[78, 38, 79, 37] Xp[79, 25, 80, 24]$
 $Xp[80, 12, 81, 11] Xp[81, 95, 82, 94] Xp[88, 76, 89, 75] Xp[89, 63, 90, 62]$
 $Xp[90, 50, 91, 49] Xp[91, 37, 92, 36] Xp[92, 24, 93, 23] Xp[93, 11, 94, 10]$

Length [K]

48

2^{48}

281 474 976 710 656