

TA office hours Wed and Thu 3-5.

Bonus points for posting HW solutions!

TT. Friday Oct. 26 9-10 @ GB404

Non homogeneous eqn's by "undetermined coeffs":

Examples. 1. $y'' - 3y' - 4y = 2 \sin x$ $\alpha_{1,2} = 4, -1$

sol'n $y_1 = \frac{1}{17}(3 \cos x - 5 \sin x)$

start
/ins

general sol'n: $y_1 + c_1 e^{4x} + c_2 e^{-x}$

2. $y'' - 3y' - 4y = 4x^2$ sol'n $y = -x^2 + \frac{3}{2}x - \frac{13}{8}$

3. $y'' - 4y = x e^x + x e^{2x}$

$x e^x$: no problem.

$x e^{2x}$: guess $(Ax^2 + Bx) e^{2x}$

In general, this works if RHS is a polynomial times an "exponential".

Even better, do systems: $y' = Ay$ $y(0) = y_0$

Sol'n $y(x) = e^{Ax} \cdot y_0$ What's e^{Ax} ?

Option 1. Define by $(e^{tA})' = A e^{tA}$ $e^{0A} = I$

... excellent but circular.

Option 2. Define $e^{tA} = \sum_{n=0}^{\infty} \frac{t^n}{n!} A^n$

done
line

Properties 1. converges!

2. satisfies $(e^{tA})' = A e^{tA}$

3. $e^{A+B} = e^A e^B$ whenever $AB=BA$.

4. $e^{(t+s)A} = e^{tA} e^{sA}$

5. $e^{C^{-1}AC} = C^{-1} e^A C$

⇒ Totally computable!