MA 212 Test #16 3-29-10

IVP $\xrightarrow{\text{solve}}$ Soln to IVP

$$\begin{cases} y' + 2y = 10e^{3t} \\ y(0) = 1. \end{cases}$$

$\mathcal{L}$

$$Y(s) = \mathcal{L}\{y(t)\}$$

$$1\left(sY(s) - \cancel{y(0)}^{1}\right) + 2Y(s) = 10\,\frac{1}{s-3}$$

$$sY - 1 + 2Y = \frac{10}{s-3}$$

$$(s+2)Y = \frac{10}{s-3} + 1\,\frac{s-3}{s-3}$$

$$Y = \frac{s+7}{(s-3)^1(s+2)^1} = \frac{\frac{10}{5}}{s-3} + \frac{\frac{5}{-5}}{s+2}$$

$$Y = \frac{2}{s-3} - \frac{1}{s+2}$$

$\mathcal{L}^{-1}$

$$y(t) = \mathcal{L}^{-1}\left\{\frac{2}{s-3} - \frac{1}{s+2}\right\}$$

$$= 2e^{3t} - 1e^{-2t}$$

A.E. $\xrightarrow[\text{for } Y]{\text{Solve AE}}$ Soln to AE

$$\frac{A+7}{(A-3)(A+2)} = \frac{A(A+2)}{(A-3)(A+2)} + \frac{B(A-3)}{A+2 \quad (A-3)}$$

$$\frac{A+7}{(A-3)(A+2)} = \frac{A(A+2) + B(A-3)}{(A-3)(A+2)}$$

$$A+7 = A(A+2) + B(A-3)$$

Use $A = 3$.

$$10 = A(5) + \cancel{B(0)}^{0} \Rightarrow A = \frac{10}{5} = 2$$

Use $A = -2$

$$5 = \cancel{A(0)}^{0} + B(-5) \Rightarrow B = -1$$

$$\frac{A+7}{(A-3)(A+2)} = \frac{\frac{10}{5}}{A-3} + \frac{\frac{5}{-5}}{A+2}$$

$A=3$ $\qquad$ $A=-2$

$$= \frac{2}{A-3} + \frac{-1}{A+2}$$