

QUIZ 9 4/10/08

Name : SOLUTION

1. Find the inverse Laplace transform of the given expression.

$$F(s) = \frac{2s-5}{(s-2)^2}; \quad \mathcal{L}^{-1}[F(s)] = ?$$

$$\frac{2s-5}{(s-2)^2} = \frac{A}{s-2} + \frac{B}{(s-2)^2}$$

$$2s-5 = A(s-2) + B$$

$$2s-5 = As - 2A + B \Rightarrow \underline{A=2}$$

$$B - 2A = -5$$

$$B - 4 = -5$$

$$\Rightarrow \underline{B=-1}$$

$$F(s) = \frac{2}{s-2} - \frac{1}{(s-2)^2}$$

$$f(t) = 2e^{2t} - e^{2t}t$$

$$= \underline{e^{2t}(2-t)}$$

$$\left[ \begin{array}{l} t \rightarrow \frac{1}{s^2} \\ e^{2t}t \rightarrow \frac{1}{(s-2)^2} \end{array} \right]$$

QUIZ 10 4/15/08

Name: SOLUTION

1. Use Laplace transform to solve the following initial value problem.

$$y'' - y' - 2y = 0 \quad y(0) = 0, \quad y'(0) = 2$$

$$s^2 Y(s) - sy(0) - y'(0) - [sY(s) - y(0)] - 2Y(s) = 0$$

$$s^2 Y(s) - 2 - sY(s) - 2Y(s) = 0$$

$$(s^2 - s - 2)Y(s) = 2$$

$$Y(s) = \frac{2}{s^2 - s - 2} = \frac{2}{(s-2)(s+1)}$$

$$\frac{2}{(s-2)(s+1)} = \frac{A}{s-2} + \frac{B}{s+1}$$

$$2 = A(s+1) + B(s-2)$$

$$2 = (A+B)s + (A-2B)$$

$$A+B=0$$

$$2A+2B=0$$

$$A-2B=2$$

$$A-2B=2$$

$$\begin{array}{r} A+B=0 \\ A-2B=2 \\ \hline 3A=2 \Rightarrow A=2/3 \end{array} \Rightarrow \underline{B=-2/3}$$

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

$$y(t) = \frac{2}{3} e^{2t} - \frac{2}{3} e^{-t}$$