

Name: _____

Quiz 17, Section 7.4, due on _____

(10 pts) Use Laplace Transforms to solve the initial value problem $y' - y = te^t \sin t$, $y(0) = 2$. Transform the right side by a multistep process - begin with the fundamental form, then include the effect of the t , then include the effect of the e^t .

$$\mathcal{L}(te^t \sin t) =$$

$$\mathcal{L}(\sin t) = \frac{1}{s^2 + 1}$$

$$\mathcal{L}(t \sin t) = -\left(\frac{1}{s^2 + 1}\right)' = \frac{2s}{(s^2 + 1)^2}$$

$$\mathcal{L}(te^t \sin t) = \frac{2(s-1)}{((s-1)^2 + 1)^2}$$

so

$$[sY(s) - 2] - [Y(s)] = \quad "$$

$$(s-1)Y(s) - 2 = \quad "$$

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

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

shifted version of #25
k=1

$$y(t) = 2e^t + (\sin t - t \cos t)e^t$$