

Q Solve IVP

$$y'' - 2y' - 3y = 0$$

$$y(1) = -3, \quad y'(1) = -17$$

Define $t = \tilde{t} + 1$ so. $y(t) = y(\tilde{t} + 1) = \tilde{y}(\tilde{t})$

then we get

$$\tilde{y}'' - 2\tilde{y}' - 3\tilde{y} = 0$$

$$\tilde{y}(0) = -3, \quad \tilde{y}'(0) = -17$$

Taking L.T. $\tilde{Y} = \mathcal{L}(\tilde{y})$

$$s^2 \tilde{Y} - 3 = \cancel{s^2 \tilde{Y} + 3s + 17} = \cancel{2s\tilde{Y} + 3 + 3\tilde{Y}}$$

$$(s^2 - 2s - 3)\tilde{Y} = -3s - 17 + 6$$

$$\Rightarrow \tilde{Y} = \frac{2}{s+1} - \frac{5}{s-3}$$

$$\tilde{y}(\tilde{t}) = 2e^{-\tilde{t}} - 5e^{3\tilde{t}} \quad \text{putting } \tilde{t} = t-1$$

$$y(t) = 2e^{-(t-1)} - 5e^{3(t-1)}$$