

13.37 Use Laplace transforms to find $y(t)$ if

$$\frac{dy(t)}{dt} + 3y(t) + 2 \int_0^t y(x) dx = u(t), \quad y(0) = 0, \quad t > 0$$

PSV

SOLUTION:

$$sY(s) + 3Y(s) + \frac{2Y(s)}{s} = \frac{1}{s} \quad Y(s)[s^2 + 3s + 2] = 1$$

$$Y(s) = \frac{1}{(s+2)(s+1)} = \frac{K_1}{s+2} + \frac{K_2}{s+1} \quad K_1 = -1 \quad K_2 = 1$$

$$Y(s) = \frac{1}{s+1} - \frac{1}{s+2} \quad \Rightarrow \quad y(t) = [e^{-t} - e^{-2t}]u(t)$$