

7.5.12.

$$y'' - 7y' + 6y = e^t + \delta(t - 2) + \delta(t - 4), \quad y(0) = y'(0) = 0$$

$$s^2 Y(s) - sy(0) - y'(0) - 7(sY(s) - y(0)) + 6Y(s) = \frac{1}{s-1} + e^{-2s} + e^{-4s}$$

$$Y(s)(s^2 - 7s + 6) = \frac{1}{s-1} + e^{-2s} + e^{-4s}$$

$$Y(s) = \frac{1}{(s-1)^2(s-6)} + \frac{1}{(s-1)(s-6)}(e^{-2s} + e^{-4s})$$

$$y(t) = \frac{e^{6t} - e^t - (6-1)te^t}{(6-1)^2} + U(t-2)\left(\frac{e^{t-2} - e^{6(t-2)}}{1-6}\right) + U(t-4)\left(\frac{e^{t-4} - e^{6(t-4)}}{1-6}\right)$$

$$y(t) = \frac{e^{6t} - e^t - 5te^t}{25} + U(t-2)\left(\frac{-e^{t-2} + e^{6(t-2)}}{5}\right) + U(t-4)\left(\frac{-e^{t-4} + e^{6(t-4)}}{5}\right)$$