

$$\dot{y} + \frac{1}{5}y = 3u_r(t)$$

$$y(0) = 7$$

Solve for  $y(t)$

$$5(\dot{y} + \frac{1}{5}y) = 5(3)u_r(t)$$

$$5\dot{y} + y = 15u_r(t)$$

$$\tau = 5$$

$$y_{fr}(t) = y(0)e^{-t/\tau} = \underline{7e^{-t/5}}$$

$$y_c(t) = t - \tau(1 - e^{-t/\tau})$$
$$= t - 5(1 - e^{-t/5})$$

$$5\dot{y} + y = u_r(t)$$

$$y_{fo}(t) = 15y_c(t) = \underline{15t - 75(1 - e^{-t/5})}$$

$$y(t) = y_{fr}(t) + y_{fo}(t) = 7e^{-t/5} + 15t - 75(1 - e^{-t/5})$$
$$= 7e^{-t/5} + 15t - 75 + 75e^{-t/5}$$
$$= \underline{82e^{-t/5} + 15t - 75}$$