

$$7b) \frac{dy}{dt} = \frac{d}{dt}(te^t) = te^t + e^t \quad (\text{product rule})$$

$$y - \frac{y}{t} = te^t - \frac{te^t}{t} = te^t - e^t$$

$$te^t + e^t \neq te^t - e^t$$

$$\therefore \frac{dy}{dt} \neq y - \frac{y}{t}$$

and y is NOT a solution

(#12) rate of change of money = growth + loss

$$\frac{dM}{dt} = 0.05M - 2000$$

$$\text{initial condition: } M(0) = \$30,000$$

(#13) a) $\frac{dy}{dt} = 3y - 6$

$$\frac{dy}{dt} = 3(y-2)$$

substitute $P = y - 2$

$$y = P + 2$$

$$\frac{dy}{dt} = \frac{d(P+2)}{dt} = \frac{dP}{dt} = 3P$$

$$\text{so, } P = Ce^{3t}$$

$$y - 2 = Ce^{3t}$$

(substitute $P = y - 2$ back)

$$\boxed{y = Ce^{3t} + 2}$$