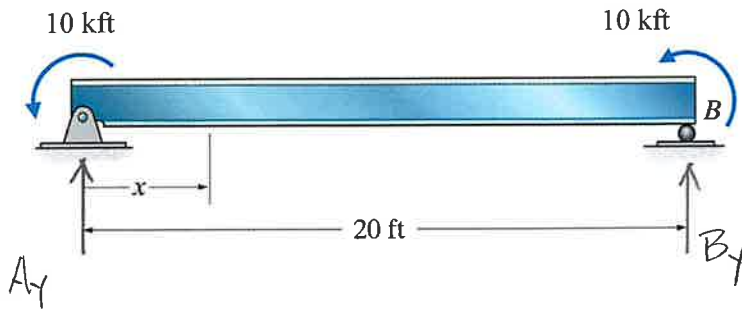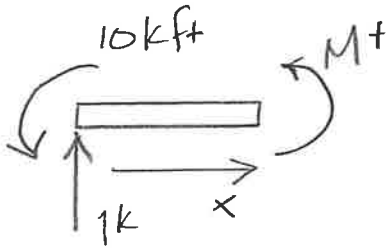Determine the equation of the elastic curve for the beam using the x coordinate valid for $0 \le x \le 20$ ft. Assume EI is constant.

10 kft

10 kft

B

x

20 ft

B_y

A_y

$$\circlearrowleft \Sigma M_B = 0$$

$$= 10 kft + 10 kft - A_y (20 ft)$$

$$\underline{A_y = 1k}$$

10 kft

M^+

1k

x

$$\circlearrowleft \Sigma M_{cut} = 0 = M + 10 kft - 1x$$

$$M = [1x - 10] kft$$

$$EI\theta = \int M dx = \frac{x^2}{2} - 10x + C_1$$

$$Y = \int \theta dx = \frac{1}{EI}\left[\frac{x^3}{6} - 5x^2 + C_1 x + C_2\right]$$

$$Y(x=0) = 0 = \underline{C_2}$$

$$Y(x=20) = 0 = \frac{1}{EI}\left[\frac{8,000}{6} - 2,000 + 20 C_1\right]$$

$$C_1 = \frac{200}{6} kft^2$$

$$\theta(x) = \frac{1}{EI}\left[\frac{x^2}{2} - 10x + \frac{200}{6}\right]$$

$$Y(x) = \frac{1}{EI}\left[\frac{x^3}{6} - 5x^2 + \frac{200x}{6}\right]$$