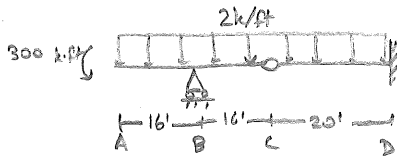
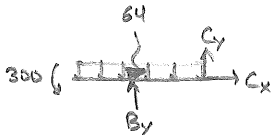


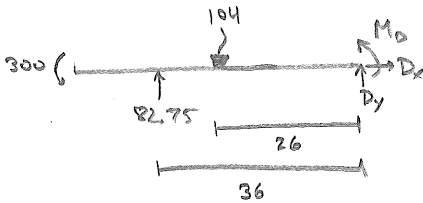
Homework 3: Problem 1



Reactions



$$\begin{aligned} \oplus \sum M_A = 0: & 64(16) - B_y(16) + 300 = 0 \\ \Rightarrow & B_y = 82.75 \text{ k} \end{aligned}$$



$$\pm \sum F_x = 0: D_x = 0$$

$$\begin{aligned} + \uparrow \sum F_y = 0: & 82.75 - 104 + D_y = 0 \\ \Rightarrow & D_y = 21.25 \text{ k} \end{aligned}$$

$$\begin{aligned} \oplus \sum M_D = 0: & 300 - 82.75(36) + 104(26) + M_D = 0 \\ \Rightarrow & M_D = -25 \text{ k}\cdot\text{ft} \end{aligned}$$

Shear and Moment

Section AB $0 \leq x < 16$



$$+ \uparrow \sum F_y = 0: -2x - V = 0$$

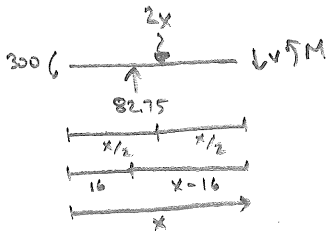
$$\Rightarrow V = -2x$$

$$\oplus \sum M_o = 0: 2x\left(\frac{x}{2}\right) + M + 300 = 0$$

$$\Rightarrow M = -x^2 - 300$$

$$V = \begin{cases} -2x & 0 \leq x < 16 \\ -2x + 82.75 & 16 \leq x < 52 \end{cases}$$

Section BD $16 \leq x < 52$



$$+ \uparrow \sum F_y = 0: 82.75 - 2x - V = 0$$

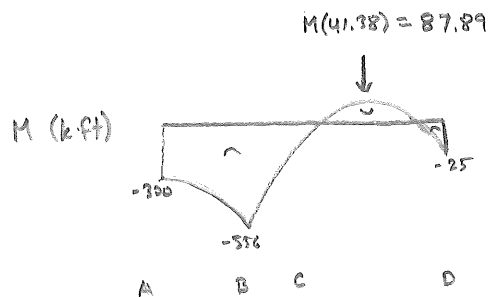
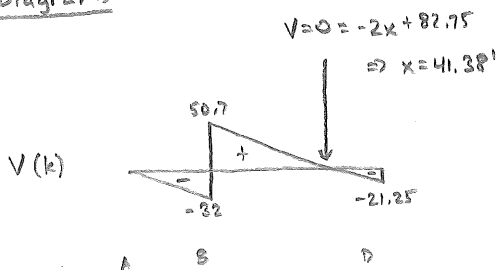
$$\Rightarrow V = -2x + 82.75$$

$$\oplus \sum M_o = 0: -82.75(x-16) + 2x\left(\frac{x}{2}\right) + M + 300 = 0$$

$$\Rightarrow M = -x^2 + 82.75x - 1624$$

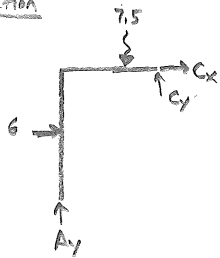
$$M = \begin{cases} -x^2 - 300 & 0 \leq x < 16 \\ -x^2 + 82.75x - 1624 & 16 \leq x < 52 \end{cases}$$

Diagrams



Homework 3: Problem 2

Reaction



$$\sum M_c = 0: 6(5) + 7.5\left(\frac{10}{2}\right) - A_y(10) = 0$$

$$\Rightarrow A_y = 5.5 \text{ k}$$

Shear and Moment

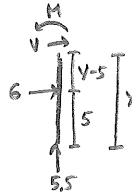
AB $0 \leq y < 5$



$$\sum F_x = 0: V = 0$$

$$\sum M_o = 0: M = 0$$

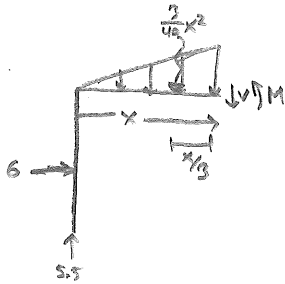
AB $5 \leq y < 10$



$$\sum F_x = 0: 6 + V = 0 \Rightarrow V = -6$$

$$\sum M_o = 0: M + 6(y-5) = 0 \Rightarrow M = -6y + 30$$

BC $0 \leq x < 20$



$$\frac{h}{x} = \frac{3}{20} \Rightarrow h = \frac{3}{20}x \quad \text{Area} = \frac{1}{2}(x)\left(\frac{3}{20}x\right) = \frac{3}{40}x^2$$

$$\sum F_y = 0: 5.5 - \frac{3}{40}x^2 - V = 0 \Rightarrow V = -\frac{3}{40}x^2 + 5.5$$

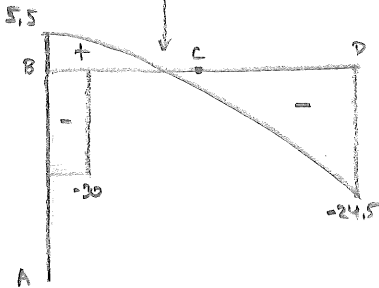
$$\sum M_o = 0: -5.5(x) + 6(5) + \frac{3}{40}x^2\left(\frac{x}{3}\right) + M = 0$$

$$\Rightarrow M = -\frac{x^3}{40} + 5.5x - 30$$

V (k)

$$V = 0 = -\frac{3}{40}x^2 + 5.5$$

$$\Rightarrow x = 8.56'$$



M (k-ft)

$$-\frac{(8.56)^3}{40} + 5.5(8.56) - 30 = 1.4 \text{ k-ft}$$

