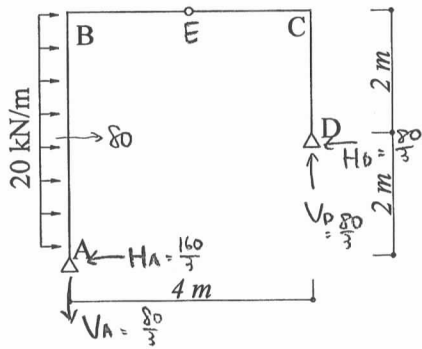


第8回

下記のMQN図をかけ。



$$M_A = 80 \times 2 - H_D \times 2 - V_D \times 4 = 0$$

$$\therefore H_D + 2V_D = 80 \dots \textcircled{1}$$

$$\sum M_E = H_D \times 2 - V_D \times 2 = 0$$

$$\therefore H_D = V_D \dots \textcircled{2}$$

$$\textcircled{1}, \textcircled{2} \text{より } H_D = V_D = \frac{80}{3} \text{ kN}$$

$$\sum X = 80 - \frac{80}{3} - H_A = 0$$

$$\therefore H_A = \frac{160}{3} \text{ kN}$$

$$\sum Y = V_D - V_A = 0$$

$$\therefore V_A = \frac{80}{3} \text{ kN}$$

M

$$A \sim B: \frac{160}{3}x - 20x \cdot \frac{x}{2}$$

$$= \frac{160}{3}x - 10x^2 \quad \frac{160}{3} - 20x \quad (x = \frac{80}{3} \text{ m})$$

M_{max}

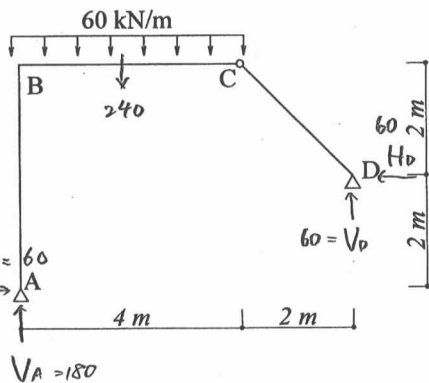
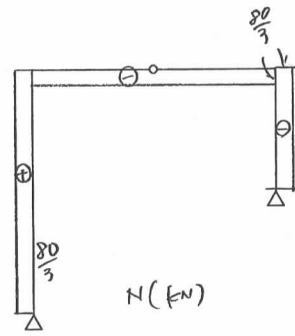
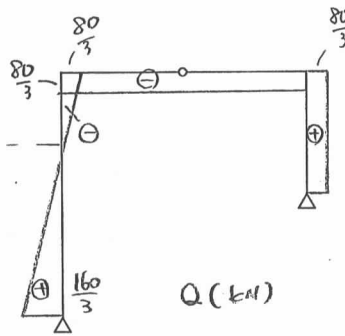
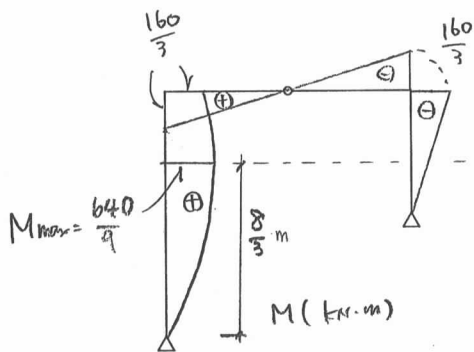
$$B \sim C: \frac{160}{3} \times 4 - 80 \times 2 - \frac{80}{3}x$$

$$= \frac{160}{3} - \frac{80}{3}x \quad -\frac{80}{3}$$

D ~ C

$$Q: -\frac{80}{3}x$$

$$-(-\frac{80}{3}x) = \frac{80}{3}$$



$$M_A = 240 \times 2 - V_D \times 6 - H_D \times 2 = 0$$

$$\therefore 3V_D + H_D = 240 \dots \textcircled{1}$$

$$\sum M_C = H_D \times 2 - V_D \times 2 = 0$$

$$\therefore H_D = V_D \dots \textcircled{2}$$

$$\textcircled{1}, \textcircled{2} \text{より } V_D = 60 \text{ kN} \quad H_D = 60 \text{ kN}$$

$$\sum X = H_A - H_D = 0 \quad \therefore H_A = 60 \text{ kN}$$

$$\sum Y = V_A + V_D - 240 = 0$$

$$\therefore V_A = 180 \text{ kN}$$

M

$$A \sim B: -60x$$

$$-60$$

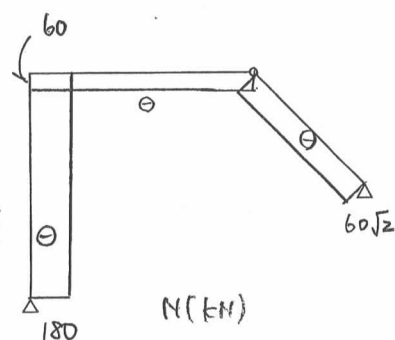
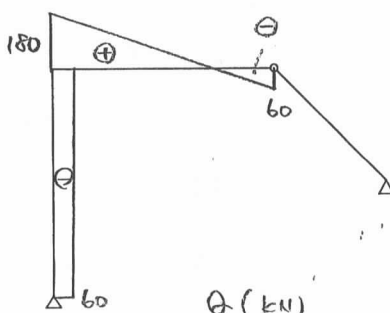
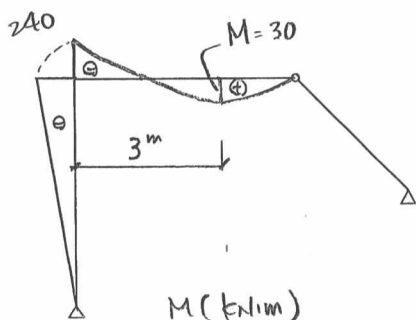
$$B \sim C: 180x - 60x \cdot \frac{x}{2} - 60 \times 4$$

$$= 180x - 30x^2 - 240 \quad 180 - 60x$$

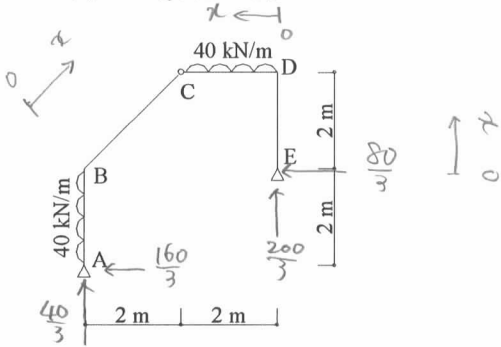
$$C \sim D: 0$$

$$0$$

H_D
 V_D
 合力はCDを
 平行移動
 CDをM, Qは0



下記のMQ図をかけ。



反力を求めよ。

$$M_A = 80 \cdot 1 - H_E \cdot 2 - V_E \cdot 4 + 80 \cdot 3 = 0 \quad \text{①}$$

$$\text{to } M_C = 80 \cdot 1 + H_E \cdot 2 - V_E \cdot 2 = 0 \quad \text{②}$$

$$\text{②より } V_E = \frac{200}{3}, H_E = \frac{80}{3}$$

$$\sum X = -H_A + 80 - \frac{80}{3} = 0 \quad \therefore H_A = \frac{160}{3}$$

$$\sum Y = V_A + \frac{200}{3} - 80 = 0 \quad \therefore V_A = \frac{40}{3}$$

$$M_{AB} = \frac{160}{3}x - 40x \cdot \frac{x}{2} = \frac{160}{3}x - 20x^2$$

$$Q_{AB} = \frac{160}{3} - 40x, \quad x = \frac{4}{3} \text{ あたり } M_{\max} = \frac{320}{9}$$

$$M_{BC} = \frac{40}{3} \cdot \frac{x}{\sqrt{2}} + \frac{160}{3} \left(2 + \frac{x}{\sqrt{2}} \right) - 40 \cdot 2 \cdot \left(1 + \frac{x}{\sqrt{2}} \right)$$

$$= -\frac{20\sqrt{2}}{3}x + \frac{80}{3}, \quad Q_{BC} = -\frac{20\sqrt{2}}{3}$$

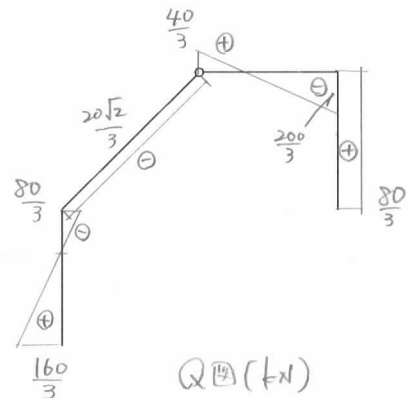
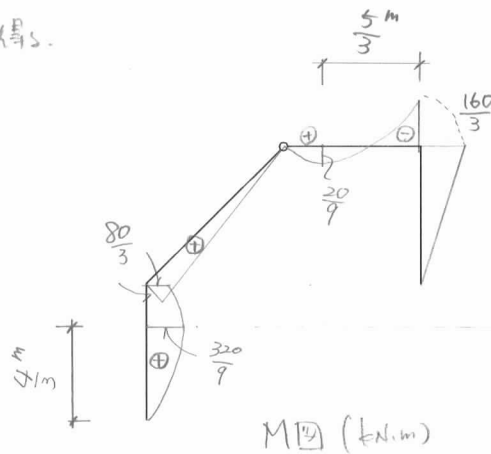
$$M_{ED} = -\frac{80}{3}x, \quad Q_{ED} = -(M') = \frac{80}{3}$$

$$M_{DC} = -\frac{80}{3} \cdot 2 + \frac{200}{3}x - 40 \cdot x \cdot \frac{x}{2}$$

$$= -\frac{160}{3} + \frac{200}{3}x - 20x^2$$

$$Q_{DC} = -(M') = -\frac{200}{3} + 40x$$

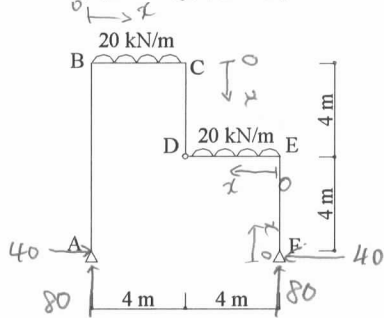
よって M, Q 図を得る。



$$Q_{BC} = 0 \text{ である } x = \frac{5}{3} \text{ m}$$

$$M_{\max} = \frac{20}{9} \text{ kN.m}$$

下記のMQ図をかけ。



反力を求めよ。

$$M_A = 80 \cdot 2 + 80 \cdot 6 - V_F \cdot 8 = 0 \quad \therefore V_F = 80$$

$$\sum Y = -80 - 80 + 80 + V_A = 0 \quad \therefore V_A = 80$$

$$\sum M_D = 80 \cdot 2 + H_F \cdot 4 - 80 \cdot 4 = 0 \quad \therefore H_F = 40$$

$$\sum X = H_A - H_F = 0 \quad \therefore H_A = 40$$

$$M_{AB} = -40x, \quad Q_{AB} = -40$$

$$M_{BC} = -40 \cdot 8 + 80x - 20x \cdot \frac{x}{2}$$

$$= -320 + 80x - 10x^2, \quad Q_{BC} = 80 - 20x$$

$$M_{CD} = 80 \cdot 4 - 20 \cdot 4 \cdot 2 - 40 \cdot (8 - x)$$

$$= -160 + 40x, \quad Q_{CD} = 40$$

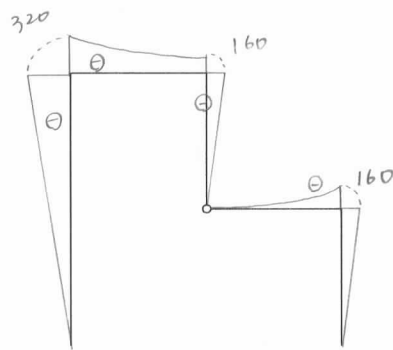
$$M_{FE} = -40x, \quad Q_{FE} = -(M') = 40$$

$$M_{ED} = -40 \cdot 4 + 80x - 20x \cdot \frac{x}{2}$$

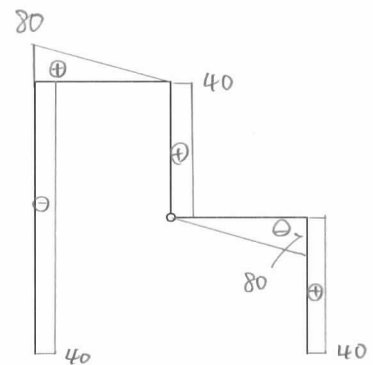
$$= -160 + 80x - 10x^2$$

$$Q_{ED} = -(M') = -80 + 20x$$

以上より M-Q 図を得る。



M图 (kN.m)



Q图 (kN)