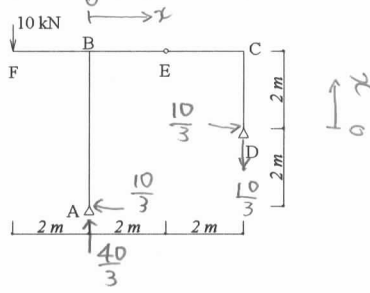


下記の M 図、Q 図をかけ。



反力を求めよ。

$$\sum X = -H_A + H_D = 0 \quad \dots ①$$

$$\sum Y = V_A - V_D - 10 = 0 \quad \dots ②$$

$$\sum M_E = V_D \cdot 2 - H_D \cdot 2 = 0 \quad \dots ③$$

$$M_A = H_D \cdot 2 + V_D \cdot 4 - 10 \cdot 2 = 0 \quad \dots ④$$

①~④より  $V_D = H_D = \frac{10}{3}$

$$V_A = \frac{40}{3}, \quad H_A = \frac{10}{3}$$

$$M_{FB} = -10x, \quad Q_{FB} = -10$$

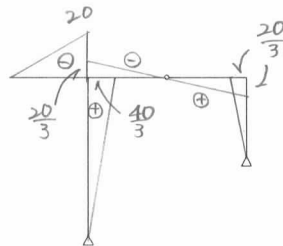
$$M_{AB} = \frac{10}{3}x, \quad Q_{AB} = \frac{10}{3}$$

$$M_{BC} = -10(x+2) + \frac{40}{3}x + \frac{10}{3} \cdot 4$$

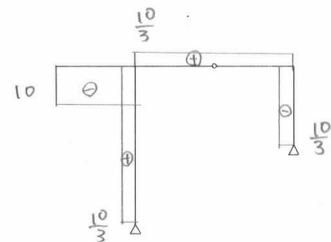
$$= \frac{10}{3}x - \frac{20}{3}, \quad Q_{BC} = \frac{10}{3}$$

$$M_{DC} = \frac{10}{3}x, \quad Q_{DC} = -(M') = -\frac{10}{3}$$

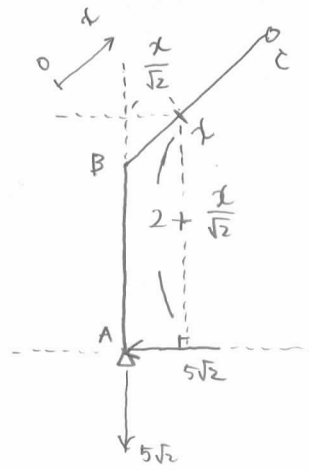
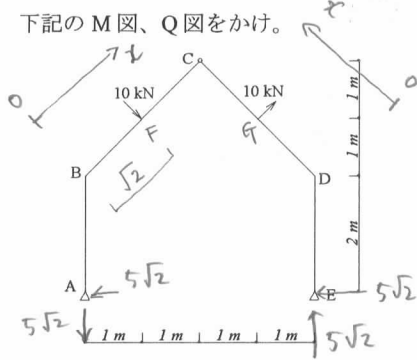
以上より M、Q 図を得る。



M 図 (kN·m)



Q 図 (kN)



反力を求める。

$$M_A = 10 \cdot 2\sqrt{2} - V_E \cdot 4 = 0 \quad \therefore V_E = 5\sqrt{2}$$

$$M_E = 10 \cdot 2\sqrt{2} - V_A \cdot 4 = 0 \quad \therefore V_A = 5\sqrt{2}$$

$$\begin{aligned} \sum M_C = -10 \cdot \sqrt{2} - 5\sqrt{2} \cdot 2 + H_E \cdot 4 = 0 \\ \therefore H_E = 5\sqrt{2} \end{aligned}$$

$$\begin{aligned} \sum M_C = -10\sqrt{2} - 5\sqrt{2} \cdot 2 + H_A \cdot 4 = 0 \\ \therefore H_A = 5\sqrt{2} \end{aligned}$$

$$M_{AB} = 5\sqrt{2}x, \quad Q_{AB} = 5\sqrt{2}$$

$$\begin{aligned} M_{BF} = -5\sqrt{2} \cdot \frac{x}{\sqrt{2}} + 5\sqrt{2} \cdot \left(2 + \frac{x}{\sqrt{2}}\right) \\ = 10\sqrt{2}, \quad Q_{B-F} = 0 \end{aligned}$$

$$\begin{aligned} M_{FC} = -5\sqrt{2} \cdot \frac{x}{\sqrt{2}} + 5\sqrt{2} \cdot \left(2 + \frac{x}{\sqrt{2}}\right) - 10(x - \sqrt{2}) \\ = 20\sqrt{2} - 10x, \quad Q_{FC} = -10 \end{aligned}$$

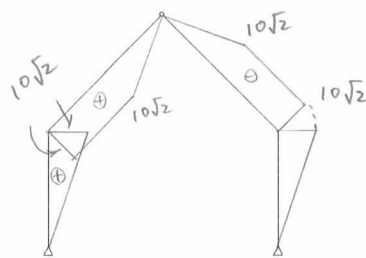
$$M_{ED} = -5\sqrt{2}x, \quad Q_{ED} = -(M') = 5\sqrt{2}$$

$$\begin{aligned} M_{DG} = 5\sqrt{2} \cdot \frac{x}{\sqrt{2}} - 5\sqrt{2} \cdot \left(2 + \frac{x}{\sqrt{2}}\right) \\ = -10\sqrt{2}, \quad Q_{DC} = 0 \end{aligned}$$

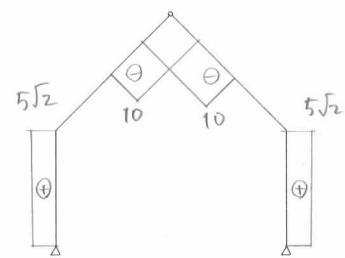
$$\begin{aligned} M_{ac} = 5\sqrt{2} \cdot \frac{x}{\sqrt{2}} - 5\sqrt{2} \cdot \left(2 + \frac{x}{\sqrt{2}}\right) + 10(x - \sqrt{2}) \\ = -20\sqrt{2} + 10x \end{aligned}$$

$$Q_{ac} = -(M_{ac}') = -10$$

よって M, Q 図は以下の通り。

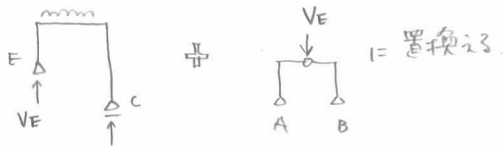
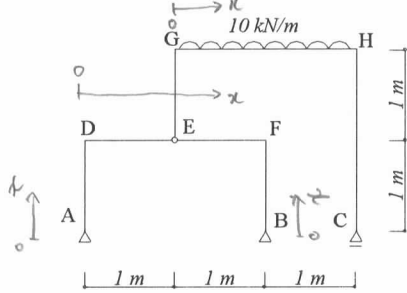


M图 (kN·m)



Q图 (kN)

下記の M 図、Q 図をかけ。



反力を求めた。

(途中計算省略)

$$V_E = V_C = 10$$

$$V_A = V_B = H_A = H_B = 5$$

$$M_{GH} = 10x - 10x \cdot \frac{x}{2} = -5x^2 + 10x \quad Q_{GH} = -10x + 10$$

$$M_{AD} = -5x, \quad Q_{AD} = -5$$

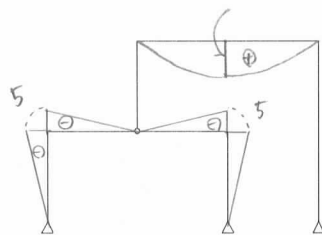
$$M_{DE} = -5 \cdot 1 + 5x = -5 + 5x, \quad Q_{DE} = 5$$

$$M_{EF} = -5 \cdot 1 + 5x - 10(x-1) = 5 - 5x, \quad Q_{EF} = -5$$

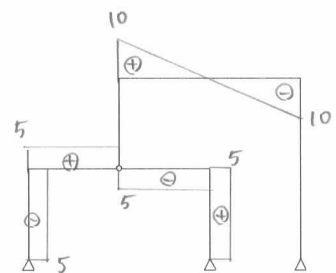
$$M_{BF} = -5x, \quad Q_{BF} = -(M') = 5$$

以上より M、Q 図を得る。

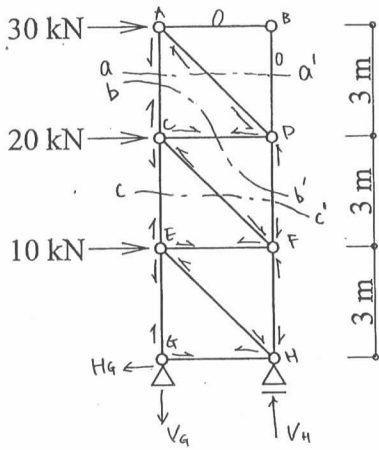
$$M_{max} = M_{x=1} = -5 + 10 = 5$$



M 図 (kN.m)  
3/4



Q 図 (kN)



$$M_H = 10 \times 3 + 20 \times 6 + 30 \times 9 - V_A \times 3 = 0 \quad V_A = 140 \text{ kN}$$

$$\sum Y = -140 + V_H = 0 \quad \therefore V_H = 140 \text{ kN}, \quad \sum X = 30 + 20 + 10 - H_A = 0 \quad \therefore H_A = 60 \text{ kN}$$

a-a' 切斷線上取定:  $M_b = 30 \times 3 - N_{AC} \times 3 = 0 \quad \therefore N_{AC} = 30 \text{ kN (+)}$

$$M_c = 30 \times 3 - N_{AD} \times \frac{3}{\sqrt{2}} = 0 \quad \therefore N_{AD} = 30\sqrt{2} \text{ kN (-)}$$

b-b' "  $\sum X = 30 - N_{CD} = 0 \quad \therefore N_{CD} = 30 \text{ kN (+)}$

$$\sum Y = -30 + N_{DF} = 0 \quad \therefore N_{DF} = 30 \text{ kN (-)}$$

c-c' "  $M_f = 30 \times 6 + 20 \times 3 - N_{CE} \times 3 = 0 \quad \therefore N_{CE} = 80 \text{ kN (+)}$

以下同様.

