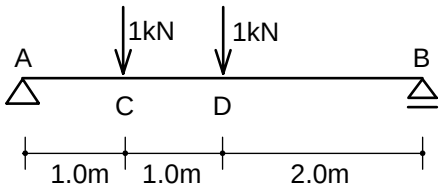
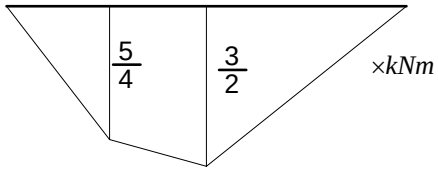
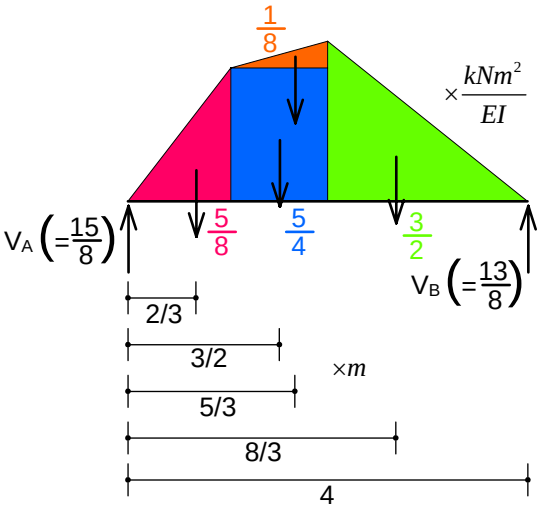
演習問題（8-2）



①曲げモーメント図



②曲げモーメントを上下反転させて，EIで割った値を分布荷重とする
単純梁の支点反力と分布荷重を集中荷重に置き換えた値



$$\Sigma Y_i = 0 : V_A - \frac{5}{8} - \frac{5}{4} - \frac{1}{8} - \frac{3}{2} + V_B = 0$$

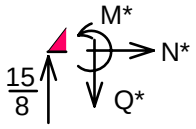
$$\rightarrow V_A + V_B = \frac{7}{2}$$

$$\Sigma M_i = 0 : -\frac{5}{8}\times\frac{2}{3} - \frac{5}{4}\times\frac{3}{2} - \frac{1}{8}\times\frac{5}{3} - \frac{3}{2}\times\frac{8}{3} + V_B \times 4 = 0$$

$$\rightarrow V_B = \frac{13}{8}$$

③各点について断面力を求める

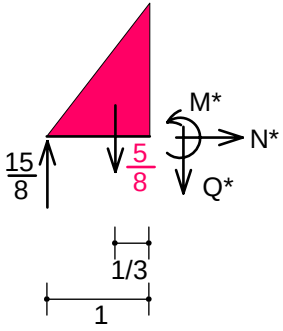
A点について



$$\Sigma Y = 0 : \frac{15}{8} - Q^* = 0 \rightarrow Q^* = \frac{15}{8}$$

$$\therefore \delta_A = M^* = 0,\ \theta_A = Q^* = \frac{15kNm^2}{8EI}$$

C点について

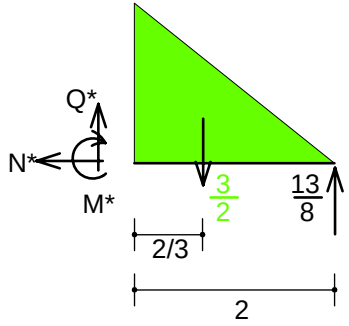


$$\Sigma Y_i = 0 : \frac{15}{8} - \frac{5}{8} - Q^* = 0 \rightarrow Q^* = \frac{10}{8} = \frac{5}{4}$$

$$\Sigma M_i = 0 : \frac{15}{8}\times 1 - \frac{5}{8}\times\frac{1}{3} - M^* = 0 \rightarrow M^* = \frac{40}{24} = \frac{5}{3}$$

$$\therefore \delta_C = M^* = \frac{5kNm^3}{3EI},\ \theta_C = Q^* = \frac{5kNm^2}{4EI}$$

D点について

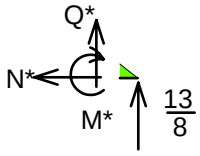


$$\Sigma Y_i = 0 : Q^* - \frac{3}{2} + \frac{13}{8} = 0 \rightarrow Q^* = -\frac{1}{8}$$

$$\Sigma M_i = 0 : M^* + \frac{3}{2}\times\frac{2}{3} - \frac{13}{8}\times 2 = 0 \rightarrow M^* = \frac{9}{4}$$

$$\therefore \delta_D = M^* = \frac{9kNm^3}{4EI},\ \theta_D = Q^* = -\frac{1kNm^2}{8EI}$$

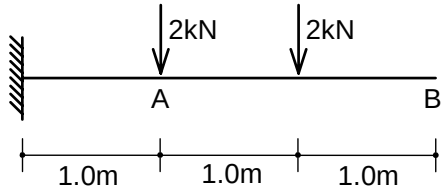
B点について



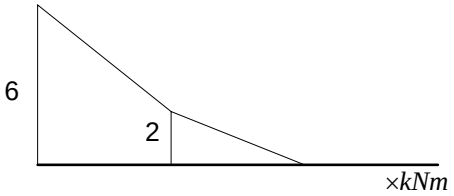
$$\Sigma Y = 0 : Q^* + \frac{13}{8} = 0 \rightarrow Q^* = -\frac{13}{8}$$

$$\therefore \delta_B = M^* = 0,\ \theta_D = Q^* = -\frac{13kNm^2}{8EI}$$

演習問題（9-1）



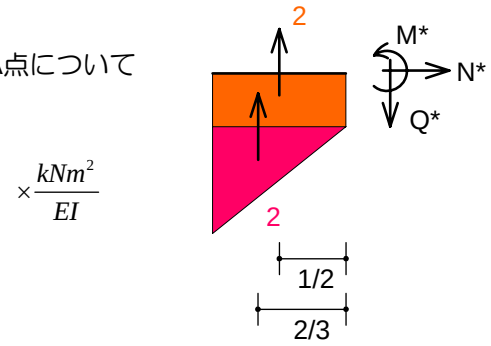
①曲げモーメント図



②曲げモーメントを上下反転させて，EIで割った値を分布荷重とする

③各点について断面力を求める

A点について

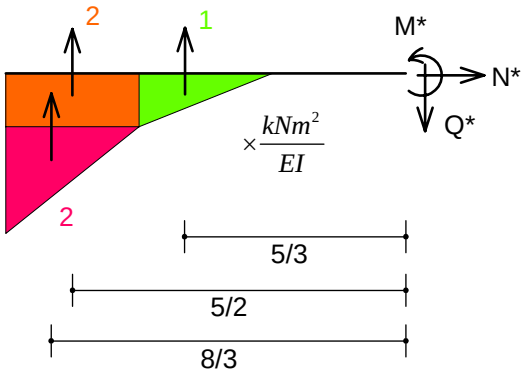


$$\Sigma Y_i = 0 : 2 + 2 - Q^* = 0 \rightarrow Q^* = 4$$

$$\Sigma M_i = 0 : 2 \times \frac{2}{3} + 2 \times \frac{1}{2} - M^* = 0 \rightarrow M^* = \frac{7}{3}$$

$$\therefore \delta_A = M^* = \frac{7kNm^3}{3EI},\ \theta_A = Q^* = \frac{4kNm^2}{EI}$$

B点について

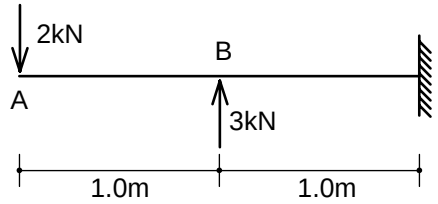


$$\Sigma Y_i = 0 : 2 + 2 + 1 - Q^* = 0 \rightarrow Q^* = 5$$

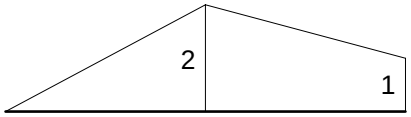
$$\Sigma M_i = 0 : 2 \times \frac{8}{3} + 2 \times \frac{5}{2} + 1 \times \frac{5}{3} - M^* = 0 \rightarrow M^* = 12$$

$$\therefore \delta_B = M^* = \frac{12kNm^3}{EI},\ \theta_B = Q^* = \frac{5kNm^2}{EI}$$

演習問題（9-2）



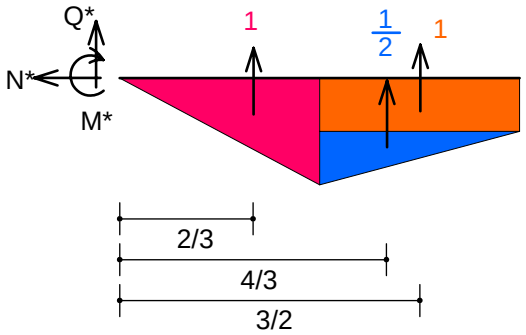
①曲げモーメント図



②曲げモーメントを上下反転させて，EIで割った値を分布荷重とする

③各点について断面力を求める

A点について

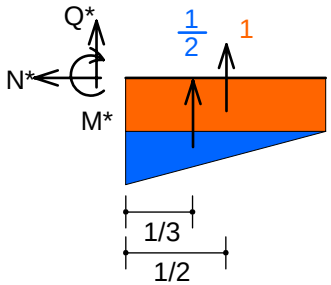


$$\Sigma Y_i = 0 : Q^* + 1 + \frac{1}{2} + 1 = 0 \rightarrow Q^* = -\frac{5}{2}$$

$$\Sigma M_i = 0 : M^* - 1 \times \frac{2}{3} - \frac{1}{2} \times \frac{4}{3} - 1 \times \frac{3}{2} = 0 \rightarrow M^* = \frac{17}{6}$$

$$\therefore \delta_A = M^* = \frac{17kNm^3}{6EI}, \theta_A = Q^* = -\frac{5kNm^2}{2EI}$$

B点について



$$\Sigma Y_i = 0 : Q^* + \frac{1}{2} + 1 = 0 \rightarrow Q^* = -\frac{3}{2}$$

$$\Sigma M_i = 0 : M^* - \frac{1}{2} \times \frac{1}{3} - 1 \times \frac{1}{2} = 0 \rightarrow M^* = \frac{2}{3}$$

$$\therefore \delta_B = M^* = \frac{2kNm^3}{3EI}, \theta_B = Q^* = -\frac{3kNm^2}{2EI}$$