技術系問題演習講座
記述　総合職Ａ

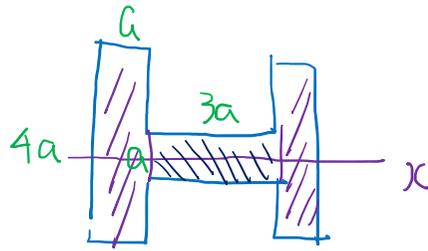2019年　国家総合職　2次記述　No.18
構造力学（土木）
(1)(a)
(2)(a)～(e)
(3)(a)(b)

(1)(a)

x 軸

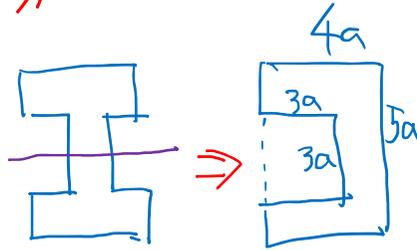$$I_x = 2 \times \frac{a(4a)^3}{12} + \frac{3a \cdot a^3}{12}$$

$$= \frac{128 + 3}{12} a^4 = \frac{131}{12} a^4 \; //$$
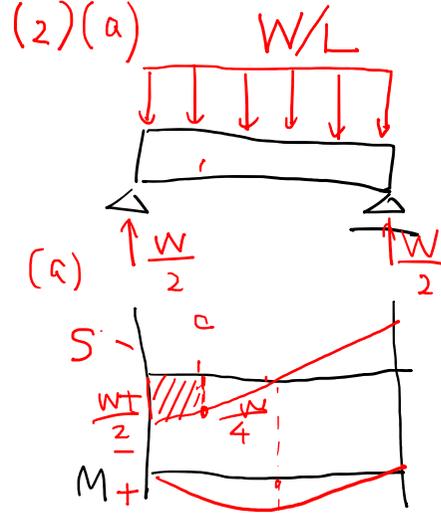
y 軸

$$I_y = \frac{4a(5a)^3}{12} - \frac{(3a)^4}{12}$$

$$= \frac{419}{12} a^4 \; //$$

(2)(a)

(a)

(a) $R_A = R_B = \frac{W}{2}$

(b) $S_{x2} = \frac{W}{4}$

$$M_x = \frac{1}{2}\left(\frac{W}{2} + \frac{W}{4}\right) \times \frac{L}{4}$$
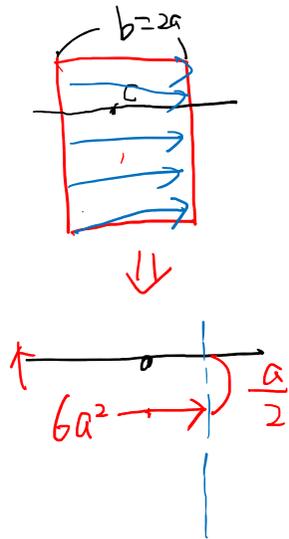
$$= \frac{3}{32} WL$$

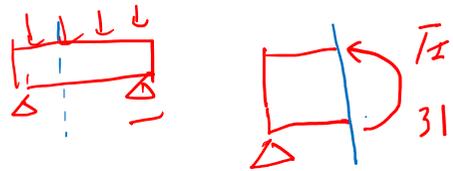(C) $I_y = \frac{2a(3a)^3}{12} = \frac{54a^4}{12} = \frac{9}{2} a^4 \; //$

(d)

$$Q_y = \int y \, dA = \int y \, b(y) \, dy$$

$$\therefore \quad Q_y = 6a^2 \times \frac{a}{2} = 3a^3 \; /\!/$$

$$\rightarrow Q_y = -3a^2 \; /\!/$$

b=2a

$6a^2 \rightarrow \quad \frac{a}{2}$
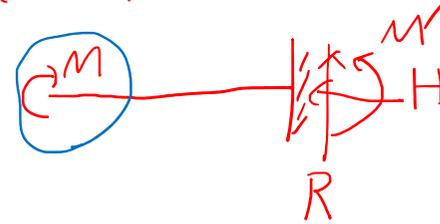
(e)

$$\sigma_z = \frac{M_z}{I_y} z = \frac{\frac{3}{32} WL}{\frac{9}{2} a^4} \times \frac{a}{2} = \frac{3 \times 2}{9 \times 32 \times 2} \times \frac{WL}{a^3} = \frac{WL}{96 a^3} \; /\!/$$

$$\rightarrow \sigma_x = -\frac{WL}{96 a^3}$$

(3)(a)

$R = 0$
$H = 0$
$M' = M$

(b)