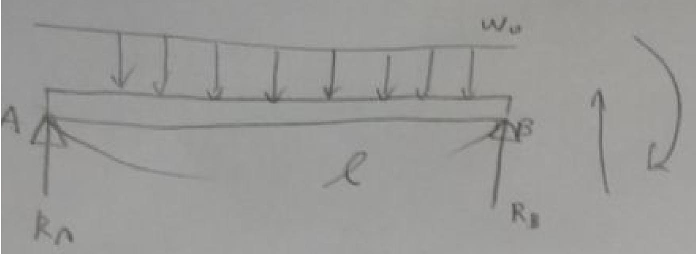
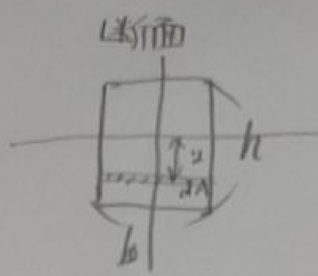
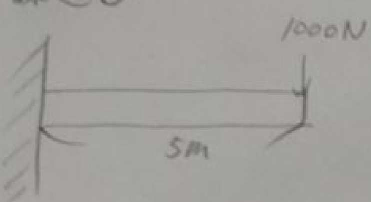
課題①

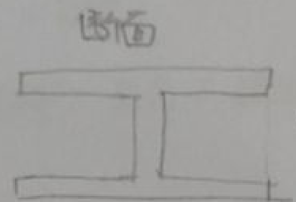


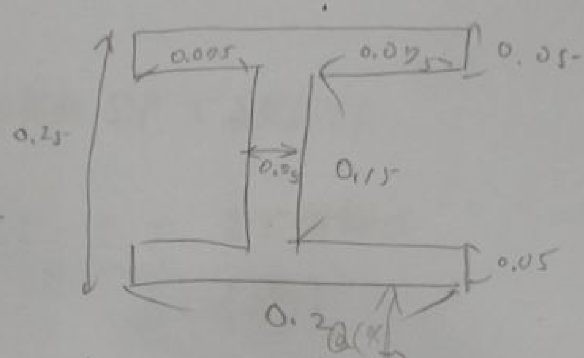


この部材に生じる最大応力を求めよう。

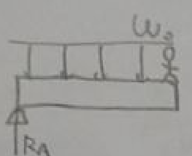
課題②







課題①



$W(x) = -W_0$

$Q(x) = -W_0 x + C_1$ ($C_1 = R_A$)

$M(x) = -\frac{1}{2}W_0 x^2 + C_1 x + C_2$ ($C_1 = R_A$, $C_2 = 0$)

$= -\frac{1}{2}W_0 x^2 + R_A x$

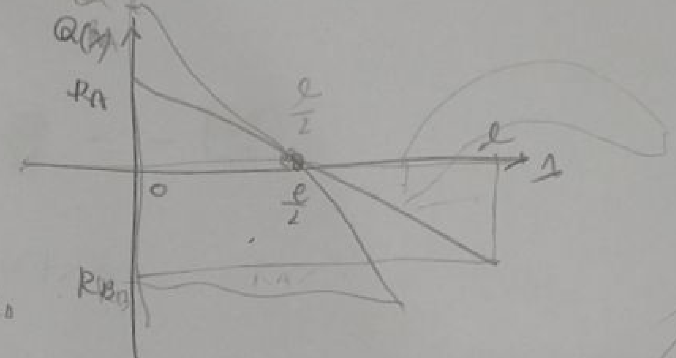
$= -\frac{1}{2}W_0\left(x^2 - \frac{2}{W_0}R_A x\right)$

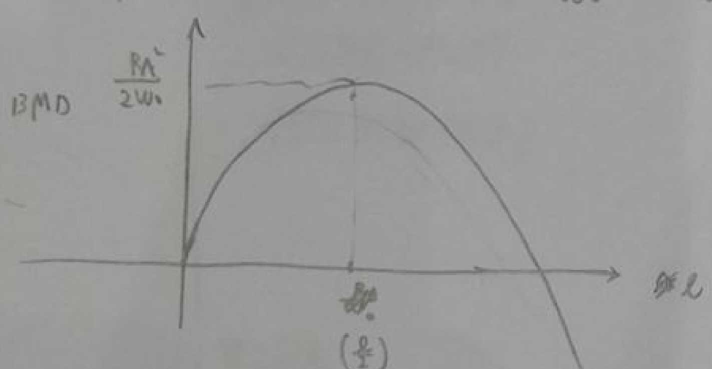
$M(x) = -\frac{1}{2}W_0\left(x - \frac{R_A}{W_0}\right)^2 + \frac{R_A^2}{2W_0}$

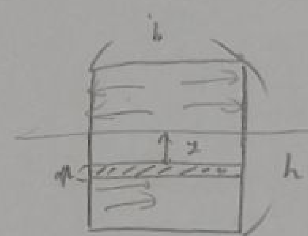
$-\frac{1}{2}W_0 \times \frac{R_A^2}{W_0^2}$

FMD

$-W_0 l + R_A = R_B$







応力 $\sigma = E\frac{y}{\rho} = M(x)\cdot\frac{y}{I}$

ρ：曲率半径

最大モーメント $\frac{R_A^2}{2W_0} = \frac{E}{\rho}I$ ― 断面2次モーメント

$I = \int_A y^2\,dA = \int_{-\frac{h}{2}}^{\frac{h}{2}} y^2\,dA \times b$

$= b\left[\frac{1}{3}y^3\right]_{-\frac{h}{2}}^{\frac{h}{2}}$

$= \frac{bh^3}{12}$

$\sigma = M(x)$

$R_A + R_B = 2R_A = W_0 l$

$R_A = \frac{W_0 l}{2}$

$\sigma(max, max) = \frac{\frac{W_0 l^2}{8}}{\frac{bh^3}{12}}\cdot\frac{h}{2}$ ($\because y_{max} = \frac{h}{2}$ 大きさ上も下も) $= \frac{3W_0 l^2}{4bh^2}$