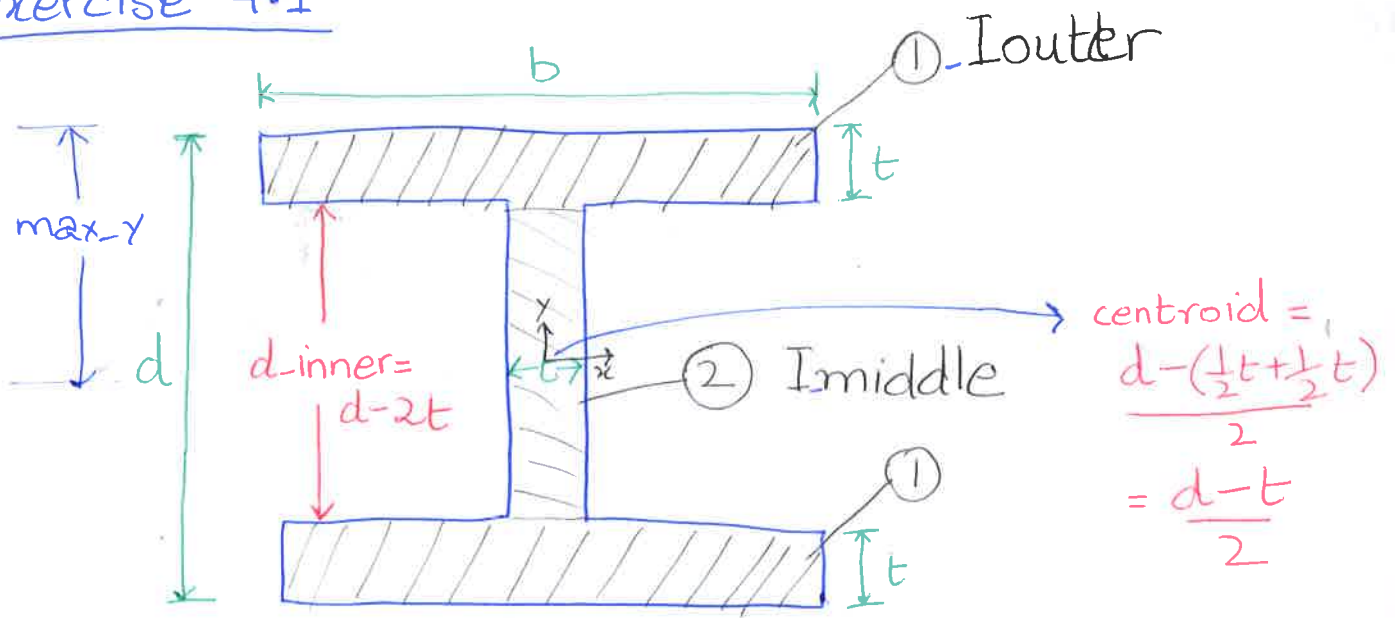


## Exercise 4.1



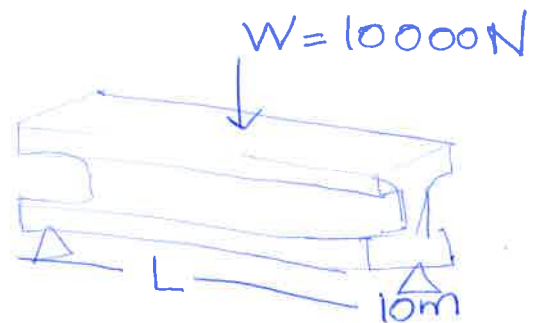
Parallel axis theorem

$$I = \frac{bd^3}{12} + Ay^2$$

$$\begin{aligned}
 I_{\text{total}} &= I_{\text{middle}} + 2I_{\text{outer}} \\
 &= \underbrace{\frac{bd^3}{12}}_{\frac{t \times d_{\text{inner}}^3}{12}} + 2 \underbrace{\left( \frac{bt^3}{12} + (b \times t) \left( \frac{d-t}{2} \right)^2 \right)}_{\frac{bd^3}{12} + Ay^2}
 \end{aligned}$$

Assume

$$\begin{aligned}
 d &= 100.0 \text{ mm} \\
 b &= 50.0 \text{ mm} \\
 t &= 5.0 \text{ mm}
 \end{aligned}$$



$$\begin{aligned}
 M &= \frac{WL}{4} \text{ Nm} \\
 &= \frac{WL}{4} \times 1.0e^3 \text{ Nmm}
 \end{aligned}$$

$$\text{max-}y = d/2$$

$$\sigma = \frac{M \times \text{max-}y}{I_{\text{total}}}$$