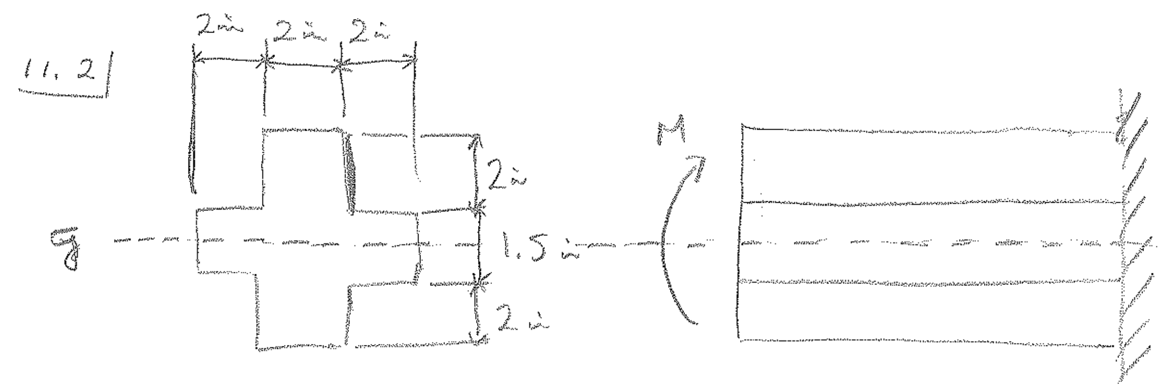
11.2



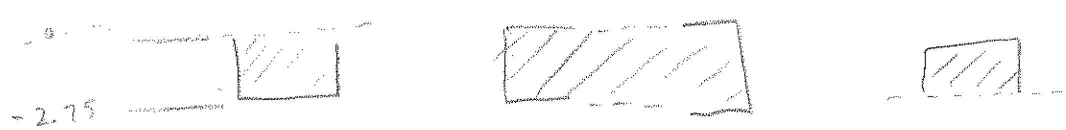
$M = 25$ kip·in

$$\sigma = -\frac{My}{I}$$

Method 1

(See second page for alternate method)

$I = \int y^2 \, dA$ Due to symmetry, $\bar{y}$ at center.



$$I = \int_{-2.75\text{ in}}^{-0.75\text{ in}} y^2 \cdot 2\text{ in}\, dy + \int_{-0.75\text{ in}}^{0.75\text{ in}} y^2 \cdot 6\text{ in}\, dy + \int_{0.75\text{ in}}^{2.75\text{ in}} y^2 \cdot 2\text{ in}\, dy$$

$$= \frac{2\text{ in}}{3} y^3 \Big|_{-2.75\text{ in}}^{-0.75\text{ in}} + \frac{6\text{ in}}{3} y^3 \Big|_{-0.75\text{ in}}^{0.75\text{ in}} + \frac{2\text{ in}}{3} y^3 \Big|_{0.75\text{ in}}^{2.75\text{ in}}$$

$$I = 28.85\text{ in}^4$$

a)

$y = 2.75$ in $\sigma = -\frac{My}{I} = -\frac{25\text{ kip}\cdot\text{in} \cdot 2.75\text{ in}}{28.85\text{ in}^4}$

@A $\boxed{\sigma = -2.38\text{ ksi}}$ ← in compression @ A

b)

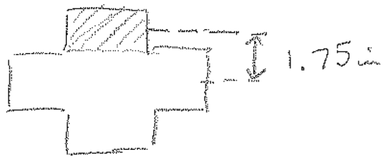
$y = 0.75$ in $\sigma = \frac{-My}{I} = \frac{-25\text{ kip}\cdot\text{in} \cdot 0.75\text{ in}}{28.85\text{ in}^4}$

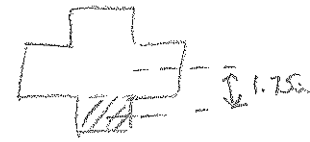
@ B $\boxed{\sigma = -0.65\text{ ksi}}$ ← in compression @B

11.2 Cont'd

Method 2

$$I = \sum_{i=1}^{3} \bar{I}_i + A_i d_i^2$$





$$= \frac{1}{12}(2\,in)(2\,in)^3 + (2\,in)(2\,in)(1.75\,in)^2 + \frac{1}{12}(6\,in)(1.5\,in)^3 + \frac{1}{12}(2\,in)(2\,in)^3 + (2\,in)(2\,in)(1.75\,in)^2$$

$$= 28.85\ in^4$$