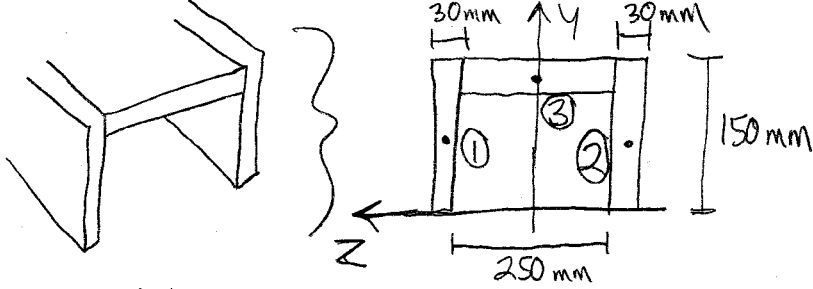
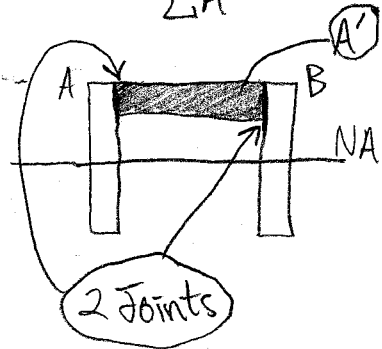


7.40)



	$\bar{y}(\text{mm})$	$A(\text{mm}^2)$	$\bar{y}A(\text{mm}^3)$	$\bar{I}(\text{mm}^4)$	$A(\bar{y}-\bar{y})^2(\text{mm}^4)$	$I_{NA}(\text{mm}^4)$
1	75	4500	337500	8.44×10^6	3.35×10^6	1.18×10^7
2	75	4500	337500	8.44×10^6	3.35×10^6	1.18×10^7
3	135	7500	1012500	5.63×10^5	8.03×10^6	8.59×10^6
Σ		16500	1687500			$3.22 \times 10^7 \text{ mm}^4 = I_{NA}$

$$\bar{y} = \frac{\Sigma \bar{y}A}{\Sigma A} = 102.27 \text{ mm} = \bar{y}$$



NOTE: since there are 2 joints, $Q = \frac{\bar{y}'A'}{2} \rightarrow$

$$Q = \frac{\bar{y}'A'}{2} = \frac{(150 - 102.27 \text{ mm})(7500 \text{ mm}^2)}{2} =$$

$$1.225 \times 10^5 \text{ mm}^3 = Q \rightarrow$$

$$q = \frac{VQ}{I} = \frac{(800 \text{ N})(1.225 \times 10^5 \text{ mm}^3)}{(3.22 \times 10^7 \text{ mm}^4)} \left(\frac{1000 \text{ mm}}{1 \text{ m}} \right) = q = 3043.5 \frac{\text{N}}{\text{m}} \rightarrow$$

NOTE: $\tau_{\text{avg}} = \left(\frac{q l}{A_N} \right)$, where l = spacing distance between nails
 $(100 \text{ mm}) + A_N$ = area of nail = $\pi \left(\frac{d}{2} \right)^2 = \pi (0.001 \text{ m})^2 \rightarrow$

$$\tau_{\text{avg}} = \frac{(3043.5 \frac{\text{N}}{\text{m}})(0.100 \text{ m})}{\pi (0.001^2 \text{ m}^2)} = 97 \text{ MPa} = \tau_{\text{avg}}$$