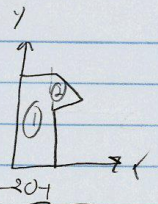
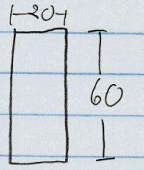
Recitation 5 Soln

5.2



(1)

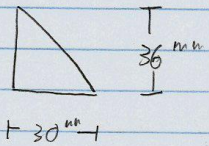


$\bar{x} = 10^{mm}$

$\bar{y} = 30^{mm}$

$A = 20 \times 60 = 120^{mm^2}$

(2)



$\bar{x} = \frac{b}{3} = 10^{mm}$ $(+20)$

$\bar{y} = \frac{h}{3} = 13^{mm}$ $(+24)$

$A = \frac{1}{2}(30)(36) = 540^{mm^2}$

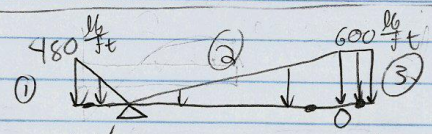
$$\bar{x} = \frac{\Sigma(\bar{x}A)}{\Sigma A} = \frac{(10 \cdot 120) + (30 \cdot 540)}{120 + 540}$$

$$\boxed{\bar{x} = 26.4^{mm}}$$

$$\bar{y} = \frac{\Sigma \bar{y} A}{\Sigma A} = \frac{(30 \cdot 120) + (37 \cdot 540)}{120 + 540}$$

$$\boxed{\bar{y} = 35.73^{mm}}$$

5.69

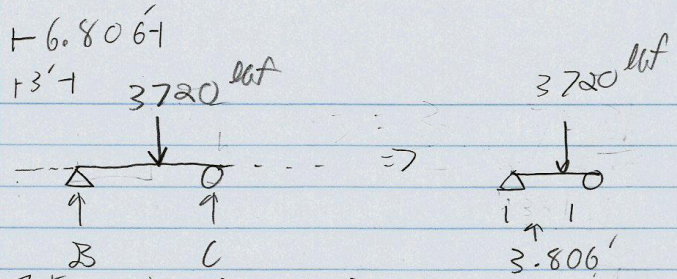


(1) $\bar{x} = \frac{b}{3} = 1'$ $A = \frac{1}{2}bh \Rightarrow \frac{1}{2} \cdot 480 \cdot 3 = 720^{lb}$

(2) $\bar{x} = \frac{b}{3} = 2' \Rightarrow (6-2)+3$ $A = \frac{1}{2}bh = \frac{1}{2} \cdot 600 \cdot 6 = 1800^{lb}$

(3) $\bar{x} = \frac{1}{2}b = 1' \Rightarrow 3+6+1$ $A = bh = 2 \cdot 600 = 1200^{lb}$

$$\bar{x} = \frac{\Sigma \bar{x} A}{\Sigma A} = \frac{(720 + 12600 + 12000)}{3720} = 6.806'$$



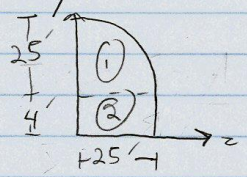
$\Sigma F_y = 0 = B + C - 3720$

$\Sigma M_B \overset{+}{\circlearrowleft} = 0 = -(3.806')(3720\ \text{lbf}) + (6')(C)$

$C = 2360$ lbf

$B = 1360$ lbf

5.111 $\bar{x} = \frac{34''}{2} = 17''$ ~ by inspection



Note: $\bar{x} \Rightarrow \bar{z}$

(1) $\bar{x} = \frac{4r}{3\pi} = 10.61''$ $A = \frac{\pi r^2}{4} = 490.87''^2$

$\bar{y} = $ " " $= 10.61'' (+4)$

(2) $\bar{x} = \frac{1}{2}b = 12.5''$ $A = bh = 100''^2$

$\bar{y} = \frac{1}{2}h = 2''$

$\bar{z} = \frac{\Sigma \bar{z} A}{\Sigma A} = \frac{(10.61 \cdot 490.87) + (12.5 \cdot 100)}{590.87}$

$\bar{z} = 10.93''$

$\bar{y} = \frac{\Sigma \bar{y} A}{\Sigma A} = \frac{(14.61 \cdot 490.87) + (2 \cdot 100)}{590.87}$

$\bar{y} = 12.48''$