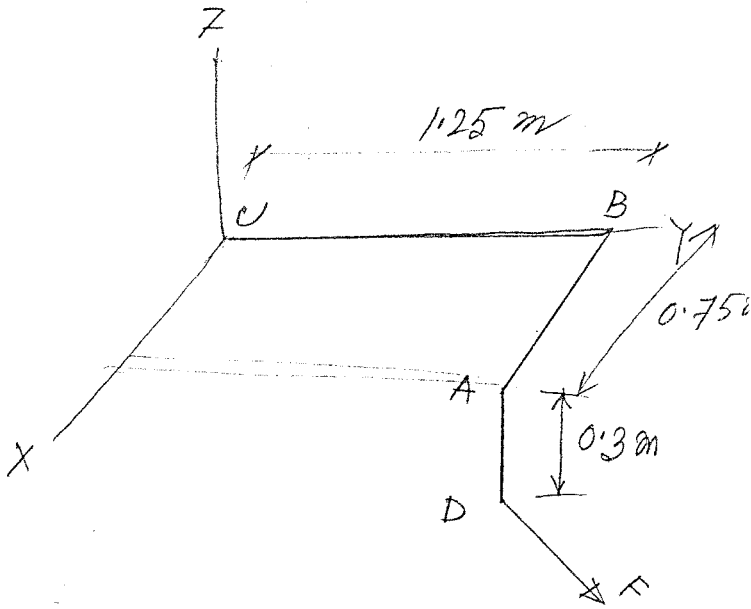
4-39



$A(0.75, 1.25, 0)$

$B(0, 1.25, 0)$

$D(.75, 1.25, -0.3)$

$C(0, 0, 0)$

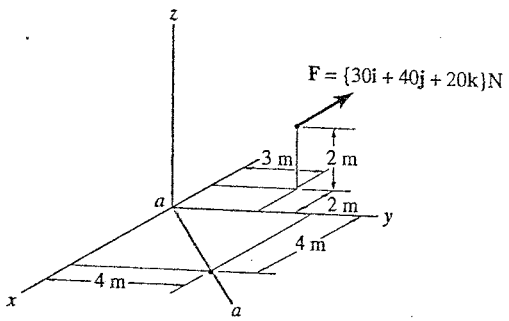
$\gamma_{BD} = .75\,i + 0\,j + (-0.3)k$ | $F = 50i + 100j - 50k$.

$\gamma_{CD} = .75i + 1.25j - 0.3k$.

$$M_B = \vec{F} \times \gamma_{BD} = \begin{vmatrix} i & j & k \\ 0.75 & 0 & -0.3 \\ 50 & 100 & -50 \end{vmatrix} = 30i + 22.5j + 75k.$$

$$M_C = \vec{F} \times \gamma_{CD} = \begin{vmatrix} i & j & k \\ 0.75 & 1.25 & -0.3 \\ 50 & 100 & -50 \end{vmatrix} \therefore M_C = -32.5\hat{i} + 22.5\hat{j} + 12.5\hat{k}$$

4-52



Prob. 4–52

$F = 30i + 40j + 20k$.

$\vec{\gamma}_F = -2i + 3j + 2k$

$\vec{\gamma}_{aa} = 4i + 4j$

$|\gamma_{aa}| = \sqrt{(4)^2 + (4)^2} = 5.6.6$

$\therefore u_{aa} = 0.71\hat{i} + 0.71\hat{j}$

$$M_{a-a} = \begin{vmatrix} u_x & u_y & u_z \\ \gamma_x & \gamma_y & \gamma_z \\ F_x & F_y & F_z \end{vmatrix} = \begin{vmatrix} 0.71 & 0.71 & 0 \\ -2 & 3 & 2 \\ 30 & 40 & 20 \end{vmatrix} = 56.8 \text{ N-m}$$

$\vec{M}_{a-a} = M_{aa} \cdot u_{aa} = 40.32\hat{i} + 40.32\hat{j}$