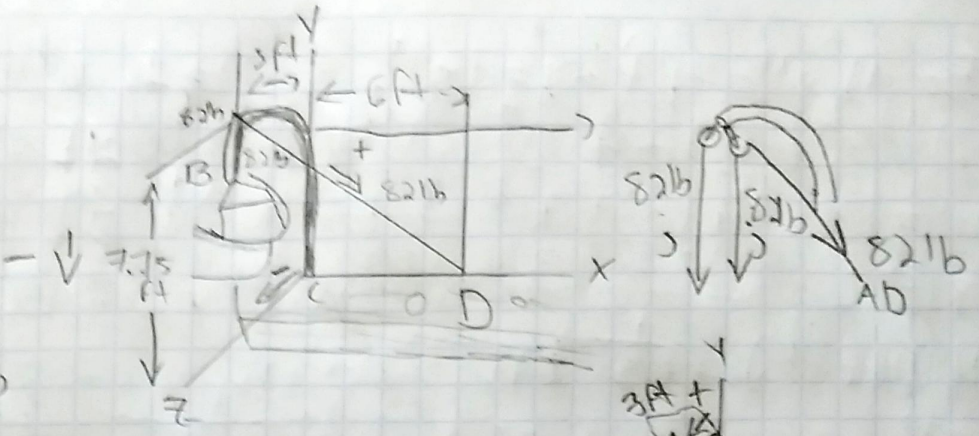
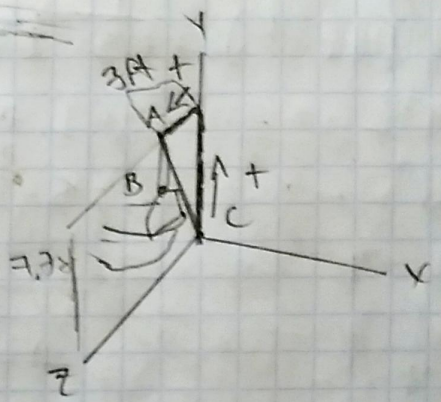
Ruiz Gudiño Jose Rafael Registro: 20110374
4°P 2/12/21

1)



ABAD = 82lb



$\Sigma \vec{F_A} = -82j - 82j + 82\lambda_{AD}$

$\vec{\lambda}_{AD} = \frac{\vec{AD}}{|\vec{AD}|} = \frac{6i - 7.75j - 3k}{\sqrt{(6)^2+(-7.75)^2+(-3)^2}}$

$\vec{\lambda}_{AD} = \frac{6i - 7.75j - 3k}{10.25}$

$\Sigma \vec{F_A} = -164j + 82\left(\frac{6i - 7.75j - 3k}{10.25}\right)$

$\Sigma \vec{F_A} = -164j + 48i - 62j - 24k$

$\Sigma \vec{F_A} = 48i - 226j - 24k$

$M_C = \vec{R} \times \vec{F_A}$

$\vec{R} = (7.75j + 3k)$

$= (7.75j + 3k) \times (48i - 226j - 24k)$

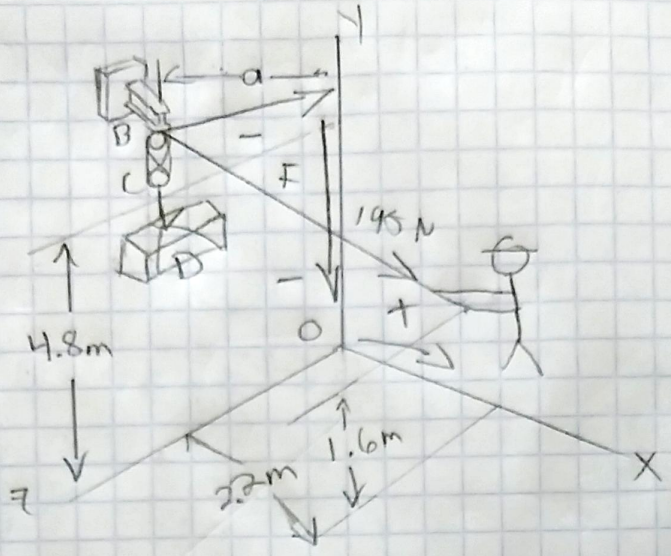
$= -372k - 186i + 144j + 678i$ lb ft

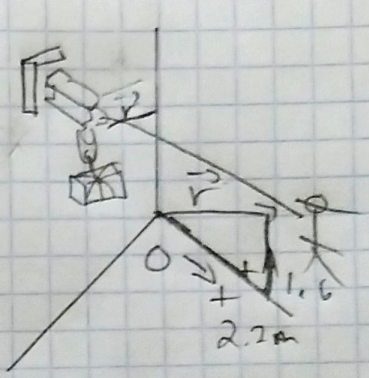
$= (492i + 144j - 372k)$ lb

$\vec{M} = \sqrt{(492)^2 + (144)^2 + (-372)^2}$

$\vec{M} = 633.390$ lb ft

2)





$\vec{F}_{DA} = 195\,N$

$\vec{M} = \vec{r} \times \vec{F}$

$\vec{r} = 2.2i + 1.6j$

$\vec{F}_{DA} = F_{DA}\lambda_{DA} = 195\,N\left(\frac{2.2i - 3.2j - ak}{\sqrt{(2.2)^2+(-3.2)^2+(-a)^2}}\right)$

$\vec{F}_{DA} = 195\,N\left(\frac{2.2i - 3.2j - ak}{\sqrt{15.08 + a^2}}\right)$

$$\vec{M} = \begin{vmatrix} i & j & k \\ 2.2 & 1.6 & 0 \\ 2.2 & -3.2 & -a \end{vmatrix} \left(\frac{195}{\sqrt{15.08+a^2}}\right)$$

$\vec{M} = \left(\frac{195}{\sqrt{15.08+a^2}}\right) * 2.2a = 132$

$\left(\sqrt{15.08+a^2}\right)^2 = \left[\left(\frac{195}{132}\right)(2.2)a\right]^2$

$15.08 + a^2 = 10.5625a^2$

$a = \sqrt{\frac{15.08}{9.5625}} = \boxed{1.25578\,m}$