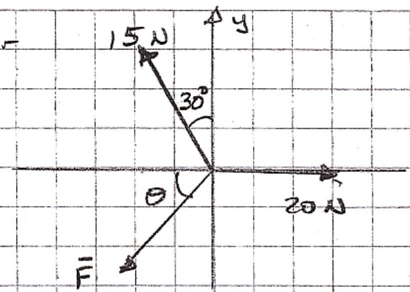
Solución: Primer Examen Final Colegiado 2012-1

Estática Vespertino

1.-




$\Sigma F_x = 20 - \frac{1}{2}(15) - F\cos\theta = 0$

$\Sigma F_y = \frac{\sqrt{3}}{2}(15) - F\,\text{sen}\,\theta = 0$

$\tan\theta = 1.039 \rightarrow \underline{\theta = 46.10°}$

$\underline{F = 18.03\ N}$

2.- $\vec{r}_{A/B} = (2, 2, 1)$ ; $|\vec{r}_{A/B}| = 3$

a) $\underline{\vec{F} = 4\hat{i} + 4\hat{j} + 2\hat{k}\ N}$

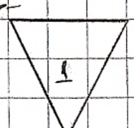
b) $\underline{\vec{M}_o = -10\hat{i} + 2\hat{j} + 16\hat{k}\ N\cdot m}$

$\vec{r}_{B/C} = (-4, -4, -2) \rightarrow \underline{\vec{M}_C = \vec{0}}$

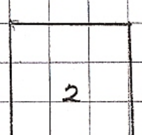
c) $\hat{u} = \frac{1}{7}(-6, 2, -3)$

$\underline{\vec{M}_{eje} = -1.96\hat{i} + 0.65\hat{j} - 0.98\hat{k}\ N\cdot m}$

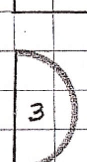
3.-




$\bar{x}_1 = 0$ ; $\bar{y}_1 = -2cm$ ; $A_1 = 18\ cm^2$




$\bar{x}_1 = 0$ ; $\bar{y}_1 = 3cm$ ; $A_2 = 36\ cm^2$




$\bar{x}_3 = -(3 - \frac{4}{\pi})cm$ ; $\bar{y}_3 = 3\ cm$

$A_3 = \frac{9\pi}{2}\ cm^2$


$\bar{x}_4 = 1\ cm$ ; $\bar{y}_4 = 1\ cm$

$A_4 = \pi\ cm^2$

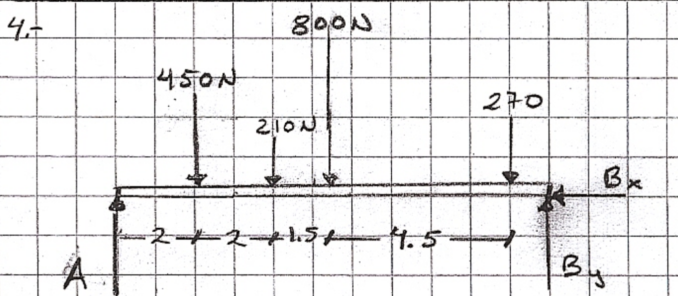
$\Sigma \bar{x}_i A_i = \bar{x}_1 A_1 + \bar{x}_2 A_2 - \bar{x}_3 A_3 - \bar{x}_4 A_4 = 21.27\ cm^3$

$\Sigma A_i = A_1 + A_2 - A_3 - A_4 = 36.72\ cm^2$

$\Sigma \bar{y}_i A_i = \bar{y}_1 A_1 + \bar{y}_2 A_2 - \bar{y}_3 A_3 - \bar{y}_4 A_4 = 32.73\ cm^3$

$\underline{\bar{x} = 0.58\ cm}$ ; $\underline{y = 0.89\ cm}$

4.-



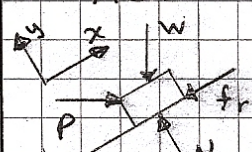

$B_x = 0$ ; $\Sigma F_y = A + B_y - 1730 = 0$

$+\circlearrowleft \Sigma M_A = -2(450) - 4(210) - 5.5(800)$

$-10(270) + 11 B_y = 0$

$\underline{A = 926.36\ N}$ ; $\underline{B_y = 803.64\ N}$

5.- Tiende a subir



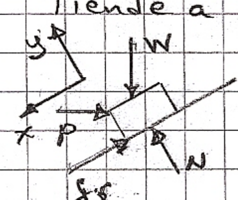

$\Sigma F_x = -\frac{1}{2}W + \frac{\sqrt{3}}{2}P - f_r = 0$

$\Sigma F_y = N - \frac{\sqrt{3}}{2}W - \frac{1}{2}P = 0$

en el límite $f_r = \mu_s N$

$P = \frac{(\mu_s\sqrt{3} + 1)W}{\sqrt{3} - \mu_s}$ ; $P = 241.73\ N$

Tiende a bajar




$\Sigma F_x = \frac{1}{2}W - \frac{\sqrt{3}}{2}P - f_r = 0$

$\Sigma F_y = N - \frac{\sqrt{3}}{2}W - \frac{1}{2}P = 0$

$P = \frac{(1 - \mu_s\sqrt{3})W}{\sqrt{3} + \mu_s}$ ; $P = 71.52\ N$

$\underline{71.52\ N \leq P \leq 241.73\ N}$