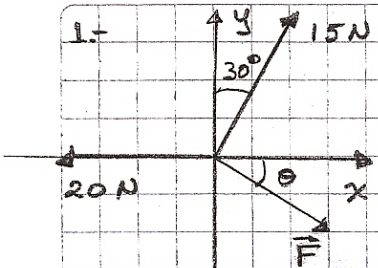
Solución: Primer Examen Final Colegiado 2012-1

Estática Matutino

1.-



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

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

$\tan\theta = 1.039 \rightarrow \underline{\theta = 46.12°}$

$\underline{F = 18.03\ N}$

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

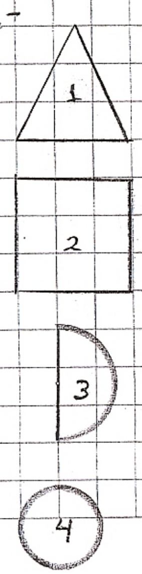
$\vec{r}_{B/D} = (4, 4, 2)$

$\vec{M}_D = \vec{0}$

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

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

3.-



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

$\bar{x}_2 = 0$ $\bar{y}_2 = -3\ cm$; $A_2 = 36\ cm^2$

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

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

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

$A_4 = \pi\ cm^2$

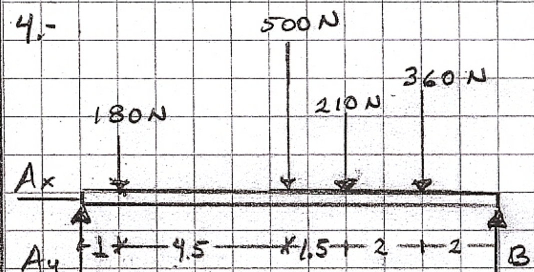
$\Sigma \bar{x}_i A_i = 21.27\ cm^3$

$\Sigma \bar{y}_i A_i = -32.73\ cm^3$

$\Sigma A_i = 36.72\ cm^2$

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

4.-



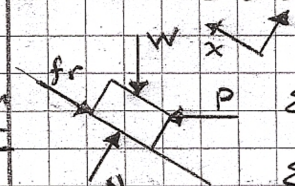
$\Sigma F_y = A_y + B - 1250 = 0$

$\overset{+}{\circlearrowleft}\Sigma M_A = -1(180) - 5.5(500) - 7(210)$

$- 9(360) + 11B = 0$

$\underline{B = 694.54\ N}$; $\underline{A_y = 555.45\ N}$

5.- Tiende a subir ; En el límite $f_r = \mu_s N$

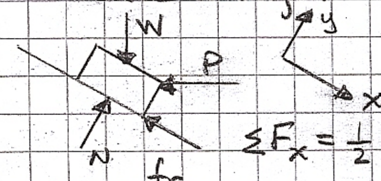


$\Sigma F_x = -\frac{1}{2}W + \frac{\sqrt{3}}{2}P - f_r = 0$

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

$P = \frac{(\mu\sqrt{3} + 1)W}{\sqrt{3} - \mu_s}$; $P = 175.77\ N$

Tiende a bajar



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

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

$P = \frac{(1 - \mu\sqrt{3})W}{\sqrt{3} + \mu_s}$, $P = 67.66\ N$

$\underline{67.66\ N \leq P \leq 175.77\ N}$