

SOLUCIÓN! SEGUNDO EXAMEN FINAL COLEGIADO

ESTÁTICA

2014-1

1- En la Tierra $F_T = G \frac{M_T m}{R_T^2} = m g_T$

En Vulcano $F_V = G \frac{M_V m}{R_V^2} = m g_V$

Como $M_V = 2 M_T$ y $R_V = 3 R_T$

a) $F_V = \frac{2}{9} G \frac{M_T}{R_T^2} m = \frac{2}{9} m g_T = m g_V$

$g_V = \frac{2}{9} g_T$, $g_V = 2.18 \text{ m/s}^2$

b) A la altura H, $F_V = \frac{2 G M_T m}{(3 R_T^2 + H)^2}$

$F_V = \frac{9 g_V R_T^2 m}{(3 R_T^2 + H)^2} \Rightarrow W = 171.69 \text{ N}$

2- $\hat{u}_{AB} = (\frac{\sqrt{3}}{2}, \frac{1}{2})$

$\vec{F}_{AB} = (1.73 \hat{i} + \hat{j}) \times 10^6 \text{ [N]}$

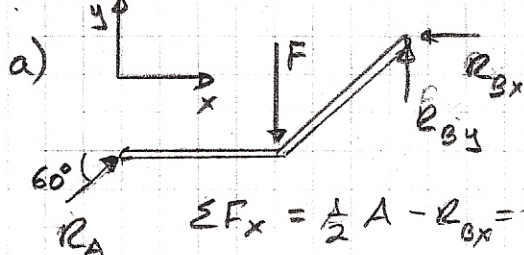
$\hat{u}_{CD} = (-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}})$

$\vec{F}_{CD} = (-2 \hat{i} + 2 \hat{j}) \times 10^6 \text{ [N]}$

3- $\bar{M}_{par} = 54.64 \hat{k} \text{ [N]}$

$d = 6.83 \text{ m}$

4.-



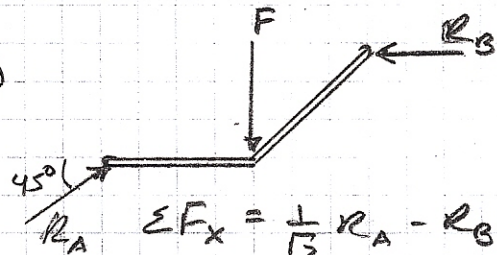
$\sum F_x = \frac{1}{2} A - R_{Bx} = 0$

$\sum F_y = \frac{\sqrt{3}}{2} A + R_{By} - F = 0$

$\sum M_A = -l F + 2l R_{By} + l R_{Bx} = 0$

$A = 0.811 F$; $R_B = 0.498 F$

b)



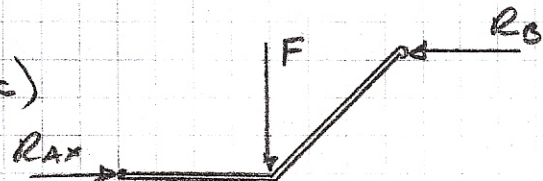
$\sum F_x = \frac{1}{\sqrt{2}} R_A - R_B = 0$

$\sum F_y = \frac{1}{\sqrt{2}} R_A - F = 0$

$\sum M_A = -l F + l R_B = 0$

$R_A = \sqrt{2} F$; $R_B = F$

c)



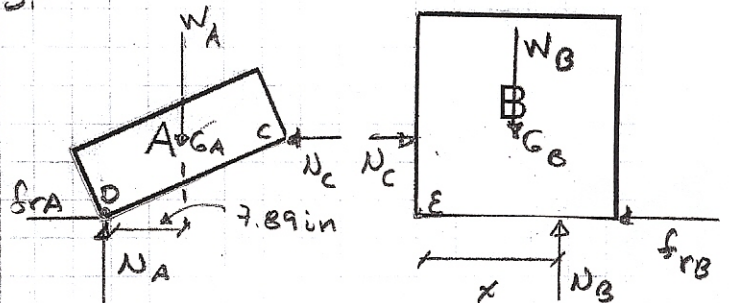
$\sum F_x = R_{Ax} - R_B = 0$

$\sum F_y = R_{Ay} - F = 0$

$\sum M_A = -l F + l R_B = 0$

$R_A = \sqrt{2} F$; $R_B = F$

5.-



Caja A

$\sum M_D = -7.89 W_A + 12 N_C = 0 \Rightarrow N_C = 13.16 \text{ lb}$

Caja B $\sum F_x = N_C - f_{rB} = 0 \Rightarrow f_{rB} = 13.16 \text{ lb}$

$\sum F_y = N_B - W_B \Rightarrow N_B = 40 \text{ lb} \Rightarrow f_{rBm} = 16 \text{ lb}$

$\sum M_E = -12 W_B + x N_B - 12 N_C = 0 \Rightarrow x = 15.94 \text{ in}$

$f_{rB} < f_{rBm}$ y $x < 24 \text{ in}$ está en equilibrio