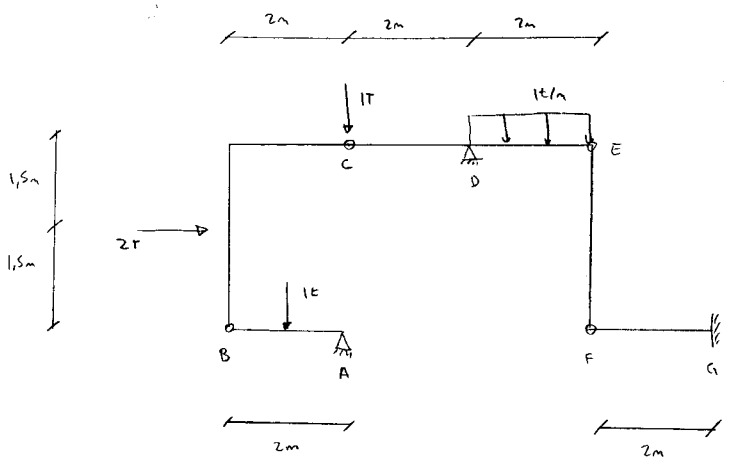
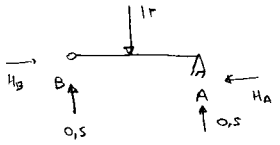
Solución - Examen marzo 2005 – Resistencia de materiales 1 y 1N

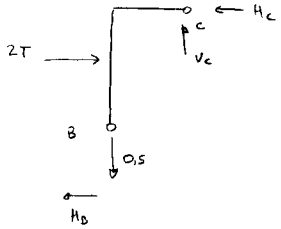
Ejercicio 1



2)



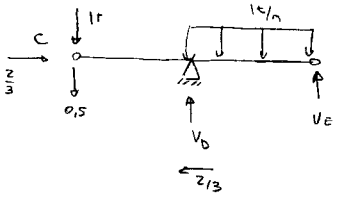
$H_A = H_B$



$$\begin{cases} V_C = 0,5 \\ H_B + H_C = 2 \\ V_C \cdot 2 + H_C \cdot 3 = 2 \cdot 1,5 \end{cases}$$

$$\hookrightarrow \quad H_C = \frac{2}{3} \rightarrow \quad H_B = \frac{4}{3}$$

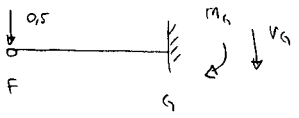
$$H_A = 4/3$$



$$V_E + V_D = 1,5 + 2 = 3,5$$

$$V_D \cdot 2 = 2 \cdot 1 + 1,5 \cdot 1^2 \rightarrow \quad V_D = 3$$

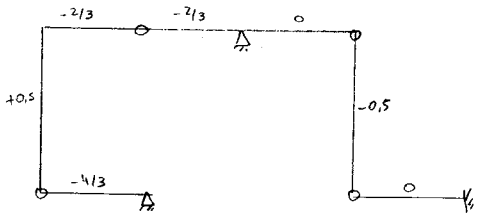
$$\rightarrow \quad V_E = +0,5$$



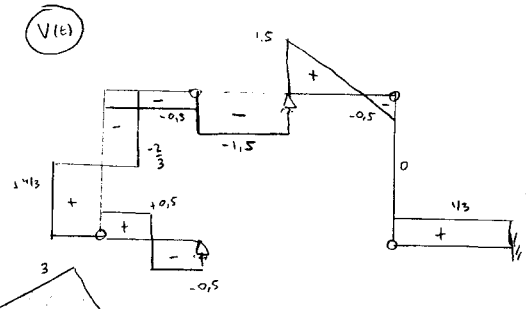
$$M_G = 0,5 \cdot 2 = 1$$

$$V_G = 0,5$$

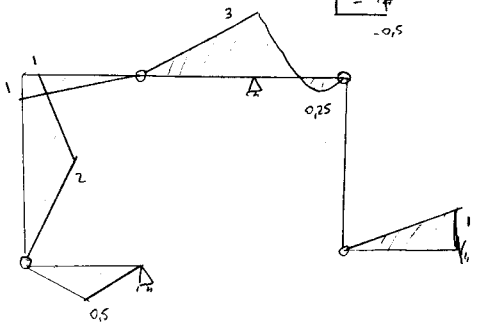
(N) (t)



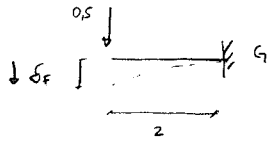
(V(t))



(M(tn))

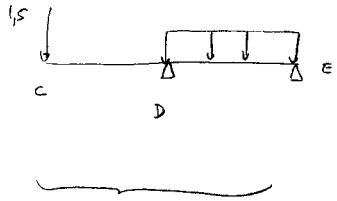


b)

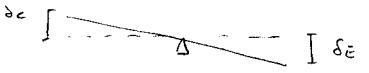


$\downarrow \delta_F = \frac{0,5 \cdot 2^3}{3EI} = \frac{4}{3EI} = \downarrow \delta_E$

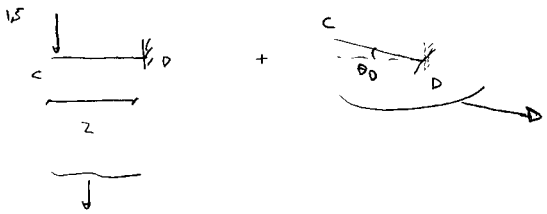
$\uparrow$ se desprecia deformación por flexión



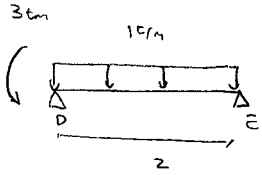
$+$



$\uparrow \delta_C' = \downarrow \delta_E = \frac{4}{3EI}$



$\downarrow \delta_C^2 = \frac{1,5 \cdot 2^3}{3EI} = \frac{4}{EI}$



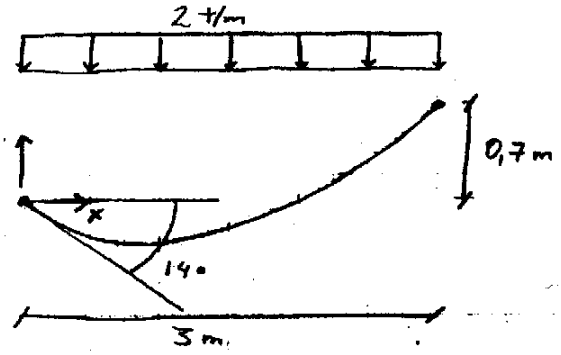
$\theta_D = \frac{1 \cdot 2^3}{24EI} - \frac{3 \cdot 2}{3EI} = \frac{-5}{3EI}$

$\downarrow \delta_C^3 = \frac{5}{3EI} \cdot 2 = \frac{10}{3EI}$

$\downarrow \delta_C = \frac{4}{EI} + \frac{10}{3EI} - \frac{4}{3} EI = \frac{6}{EI} \Rightarrow \boxed{\downarrow \delta_C = \frac{6}{EI}}$

Solución – Examen Febrero 2005 – Resistencia de Materiales 1 y 1N

Ejercicio 2



a) $\frac{d^2y}{dx^2} = \frac{\omega_e}{H} = A$

$\frac{A}{2}x^2 + Bx + C = y(x)$

$y(0) = 0 \Rightarrow \underline{C = 0}$

$y'(x) = Ax + B$

$y'(0) = -\tan(14°) = \underline{-0,25 = B}$

$y(3m) = 4,5m^2 A + 3m(-0,25) = 0,7m$

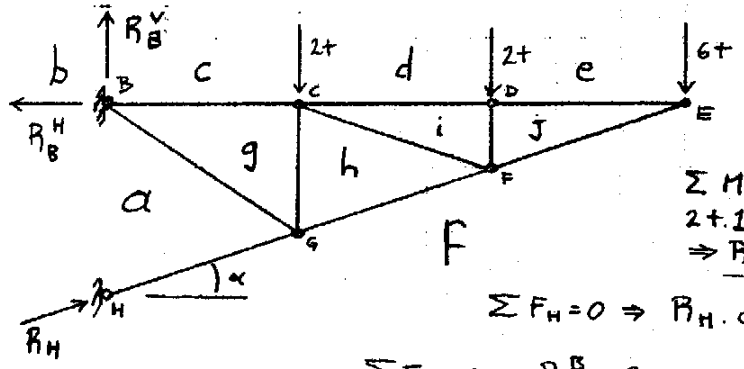
$\Rightarrow \underline{A = 0,32\ t/m} \Rightarrow H = 6,2t$

La tensión max se da en B, máxima pendiente.

$y'(3m) = 0,71 \quad \frac{V(3m)}{H} = 0,71 \Rightarrow V(3m) = 4,4t \Rightarrow \boxed{T_{max} = 7,6}$

$y'(x) = 0 \Rightarrow 0,32\ t/m\ x - 0,25 = 0 \Rightarrow x = 0,78\ m$

$y(0,78m) = 0,16 t/m (0,78m)^2 - 0,25(0,78m) = \boxed{-0,098\ m = y_{max}}$



$tg\,\alpha = 1/3 \Rightarrow \alpha = 18,43$

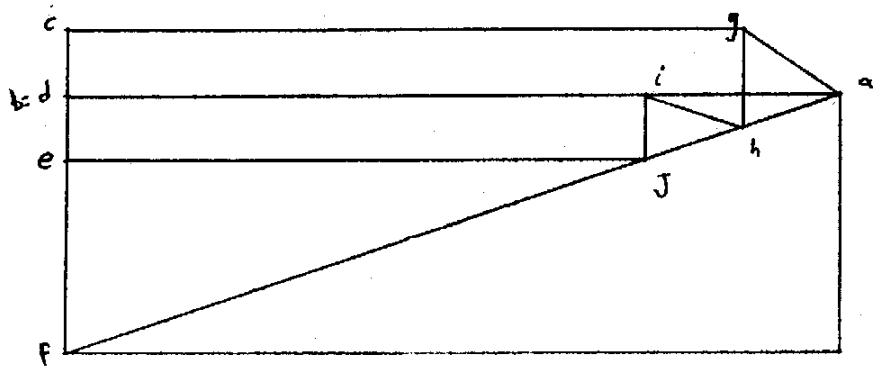
$\Sigma M_B = 0 \Rightarrow$

$2t \cdot 1m + 2t \cdot 2m + 6t \cdot 3m = R_H \cos\alpha \cdot 1m$

$\Rightarrow \underline{R_H = 25,3t}$

$\Sigma F_H = 0 \Rightarrow R_H \cdot \cos\alpha - R_B^H = 0 \Rightarrow \underline{R_B^H = 24t}$

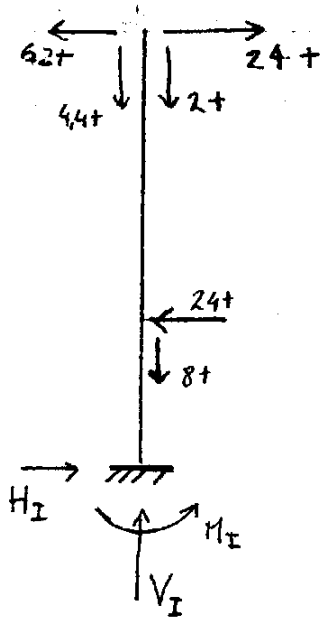
$\Sigma F_V = 0 \Rightarrow R_V^B = 2t + 2t + 6t - R_H \operatorname{sen}\alpha \Rightarrow \underline{R_B^V = 2t}$



Normal en reticulado

Barra	BC	CD	DE	EF	FG	GH	BG	GC	CF	FD
Fuerza	21 t	18 t	18 t	-19 t	-22,2	-25,3	1,6	-3 t	3,2 t	-2 t

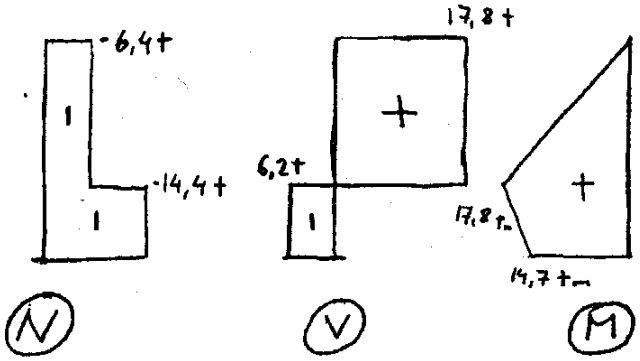
El momento y cortante es nulo en todas las barras



$M_I = 17,8\,t \cdot 1,5\,m - 24\,t \cdot 0,5\,m = 14,7\,t\,m$

$V_I = 4,4\,t + 2\,t + 8\,t = 14,4\,t$

$H_I = 6,2\,t + 24\,t - 24\,t = 6,2\,t$



Solución - Examen marzo 2005 – Resistencia de materiales 1 y 1N

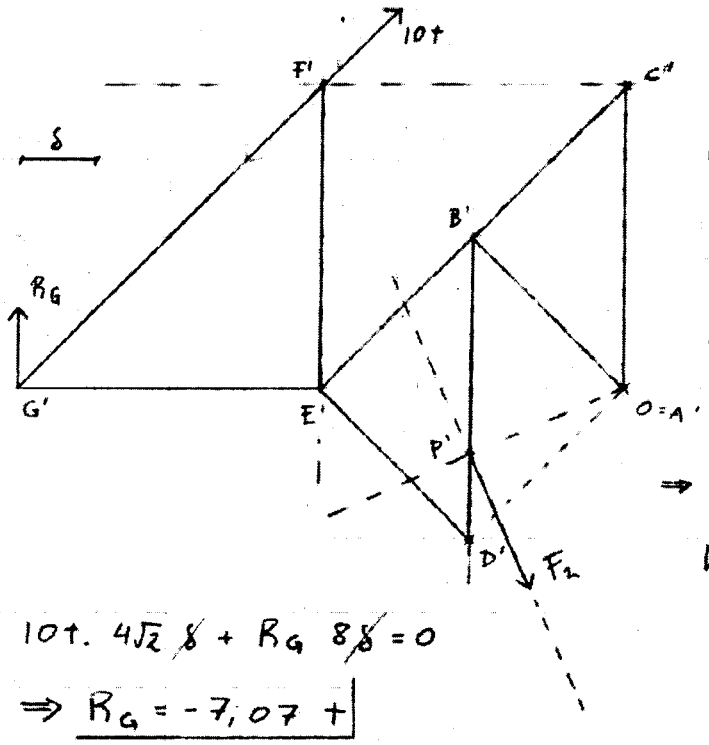
Ejercicio 3 (Solo R1N)

a) Cond necesaria: $3D = 1B + 2A + 3S + V_{AT}$

$\Rightarrow \quad 3.3 \overset{?}{=} 1.1 + 2.2 + 3$

$9 > 8 \Rightarrow$ el sist no es invariante

b)



Impongo un desplazamiento al punto C

$\delta_c = 4\delta$

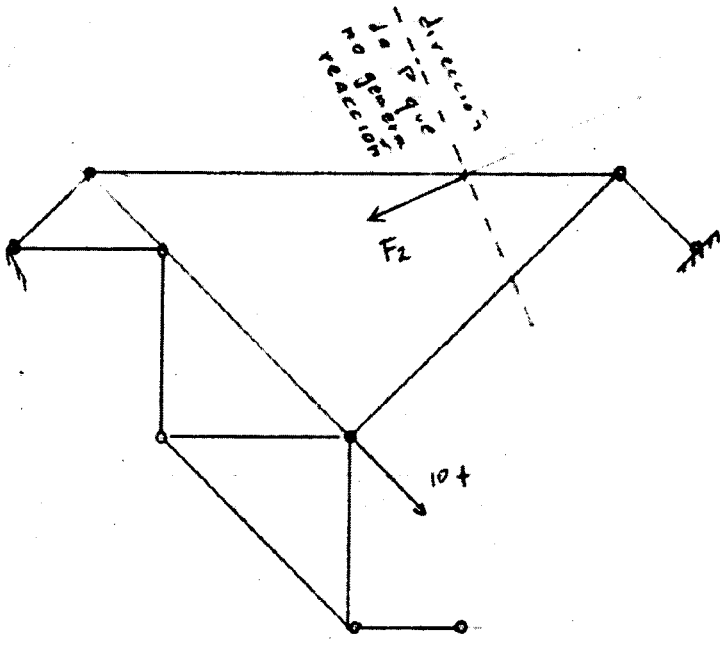
Obtengo los puntos en este orden:

O, A, C, B, D, E, F, G

$\Rightarrow$ agrego una biela horizontal en G

c) $10t \cdot 4\sqrt{2}\,\delta + R_G\, 8\delta = 0$

$\Rightarrow \boxed{R_G = -7{,}07\ t}$



d) $10t \cdot 4\sqrt{2}\,\delta - 2{,}2\,\delta F_2 = 0$

$\Rightarrow \boxed{F_2 = 25{,}7\ t}$