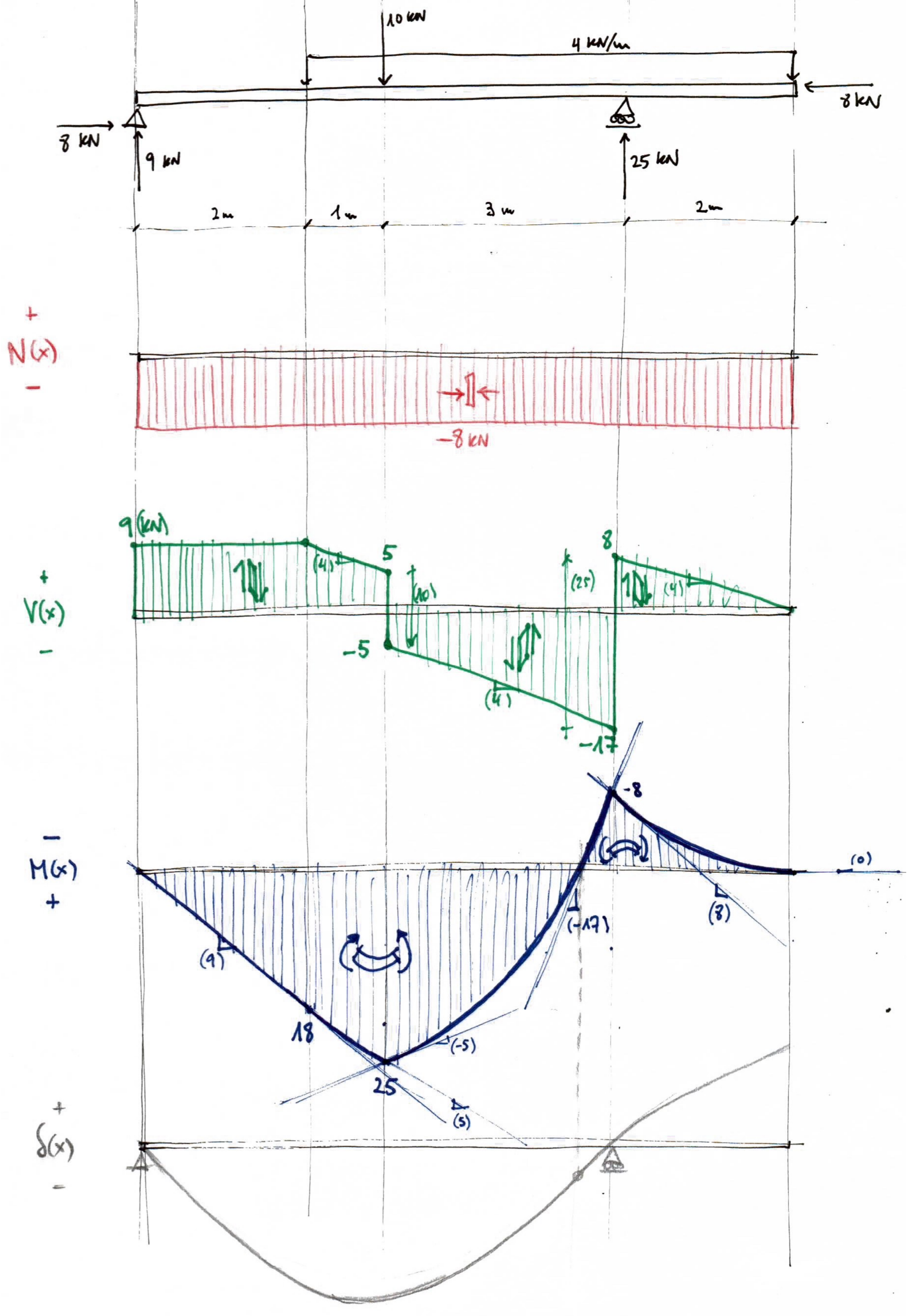
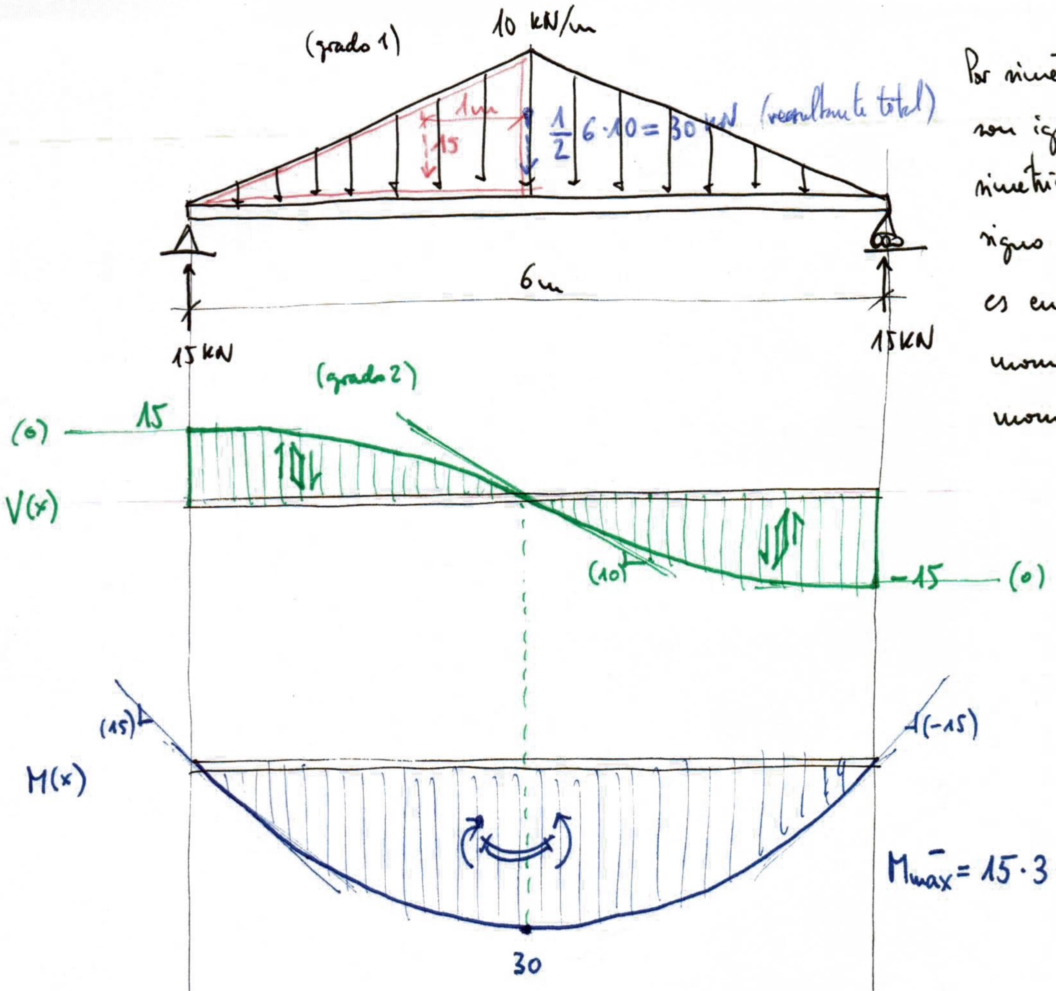
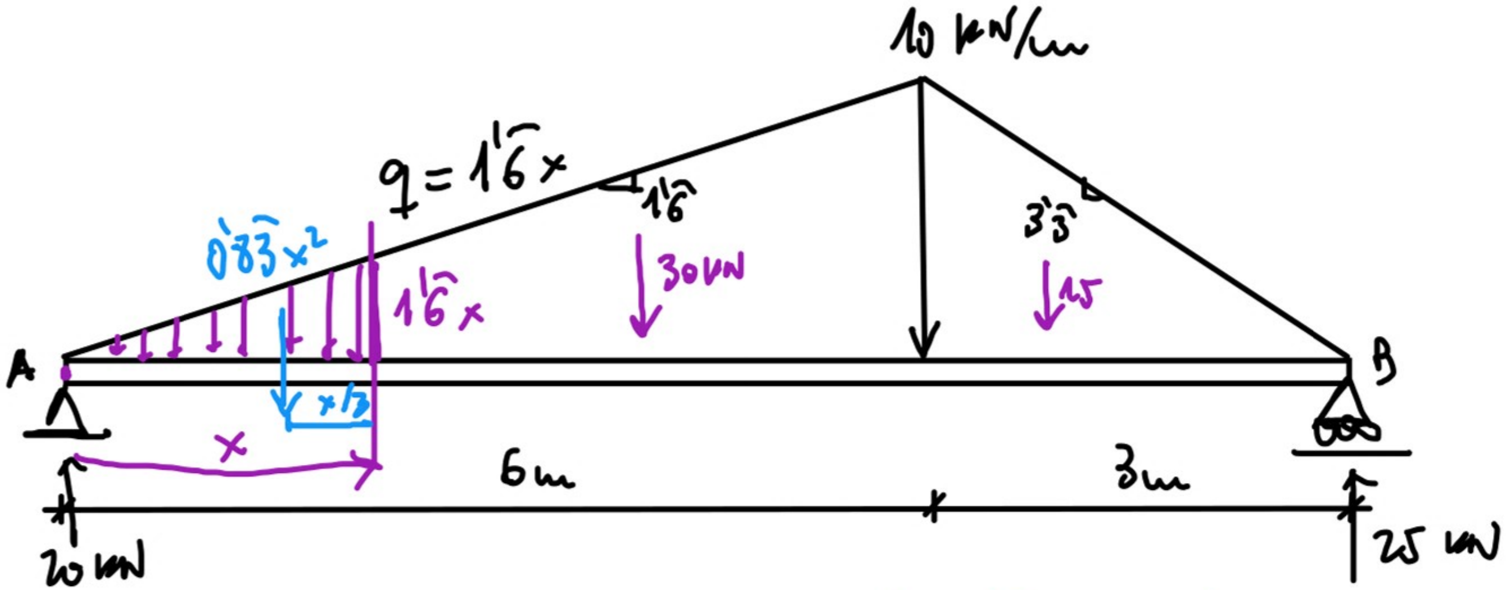

10 kN
4 kN/m
8 kN
8 kN
9 kN
25 kN
2 m
1 m
3 m
2 m
N(x)
-8 kN
V(x)
9 (kN)
5
-5
8
-17
(4)
(10)
(25)
(4)
(4)
M(x)
-8
(0)
(-17)
(8)
(9)
18
25
(-5)
(5)
δ(x)

Por simetría, las dos reacciones son iguales, el cortante es simétrico pero cambiado de signo, su corte con el eje es en el centro (punto de momento máximo) y los momentos son simétricos



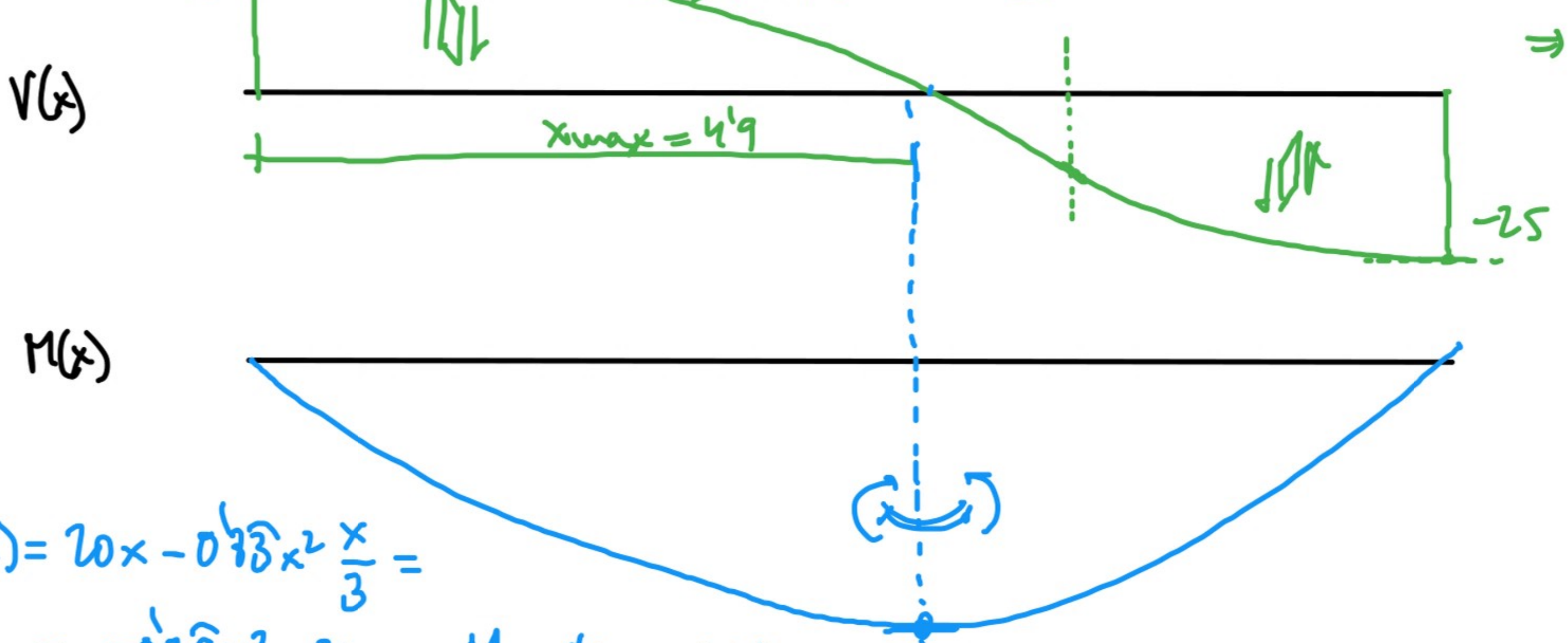
$\bar{M}_{max} = 15\cdot 3 - 15\cdot 1 = 30$ kNm

Que la nieve esté más apelotonada hacia el centro es desfavorable, porque está más lejos de los apoyos, y por tanto el "camino de las fuerzas" es más largo. Si la carga fuera repartida, el momento máximo sería $\frac{qL^2}{8} = 22'5$, que es el 75% del caso actual (se demuestra que la expresión de momento máximo para carga bitriangular es $\frac{qL^2}{12}$).



$V(x)=20-\frac{1}{2}\times 1'\hat{6}x = -0'8\hat{3}x^2+20=0 \Rightarrow$

$\Rightarrow x \simeq 4'9\,m$

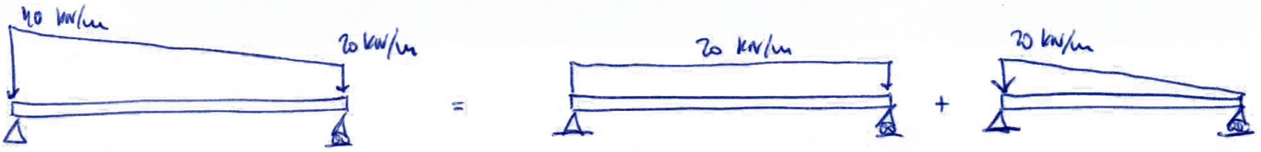


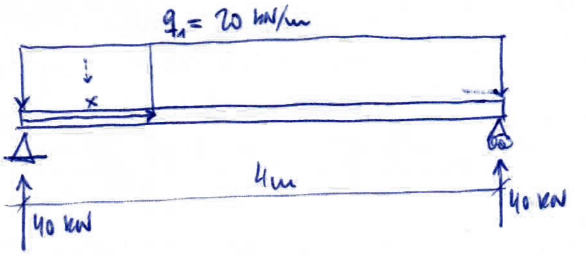
$M(x)=20x-0'8\hat{3}x^2\,\frac{x}{3}=$

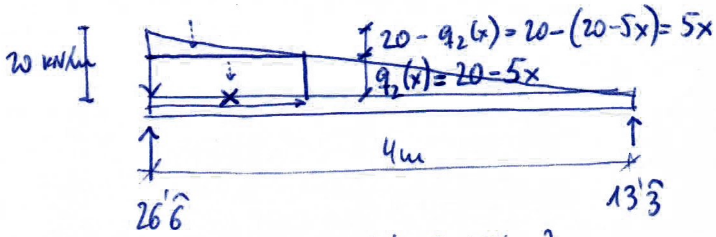
$=\underline{-0'2\hat{6}x^3+20x}$

$M^+_{max}=M(4'9)=65'3$

1.1) a)



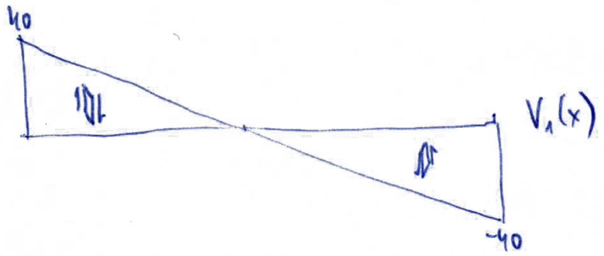


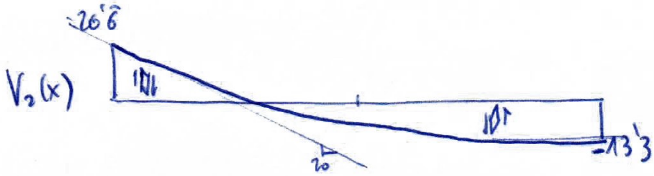


$$q_2(x) = mx + b \quad \left\{ \begin{array}{l} b = 20 \text{ kN/m} \\ m = \frac{20}{4} = 5 \end{array} \right\} \Rightarrow q_2(x) = 20-5x$$

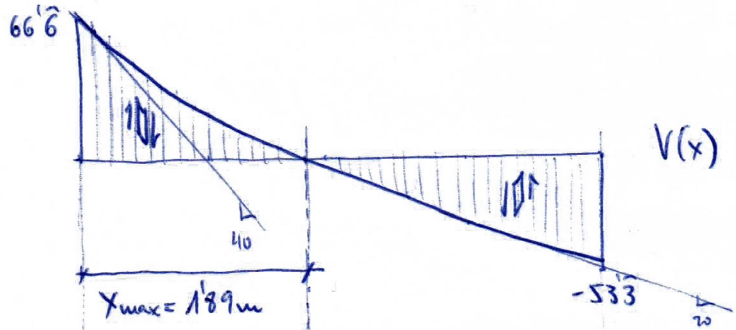
$V_1(x) = 40 - 20x$

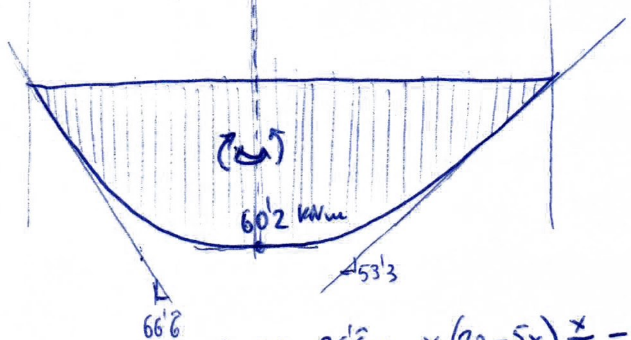
$$V_2(x) = 26'\hat{6} - x(20-5x) - \frac{1}{2} x\, 5x = \cdots = 2'5x^2 - 20x + 26'\hat{6}$$





$$V(x) = V_1(x) + V_2(x) = \cdots = 2'5x^2 - 40x + 66'\hat{6} \; ; \; V(x_{max}) = 0 \Rightarrow \cdots \Rightarrow x_{max} = \left\{ \begin{array}{l} 14'11 \text{ m. NO} \\ \underline{1'89 \text{ m}} \end{array} \right.$$





$$M_1(x) = 40x - 20\frac{x^2}{2} = -10x^2 + 40x$$

$$M_2(x) = 26'\hat{6}x - x(20-5x)\frac{x}{2} - \frac{1}{2}x \cdot 5x \cdot \frac{2}{3}x = \cdots = 0'8\hat{3}x^3 - 10x^2 + 26'6x$$

$$M(x) = M_1(x) + M_2(x) = \cdots = 0'83x^3 - 20x^2 + 66'\hat{6}x$$ (Comprobación: $M'(x) = V(x)$ ✓)

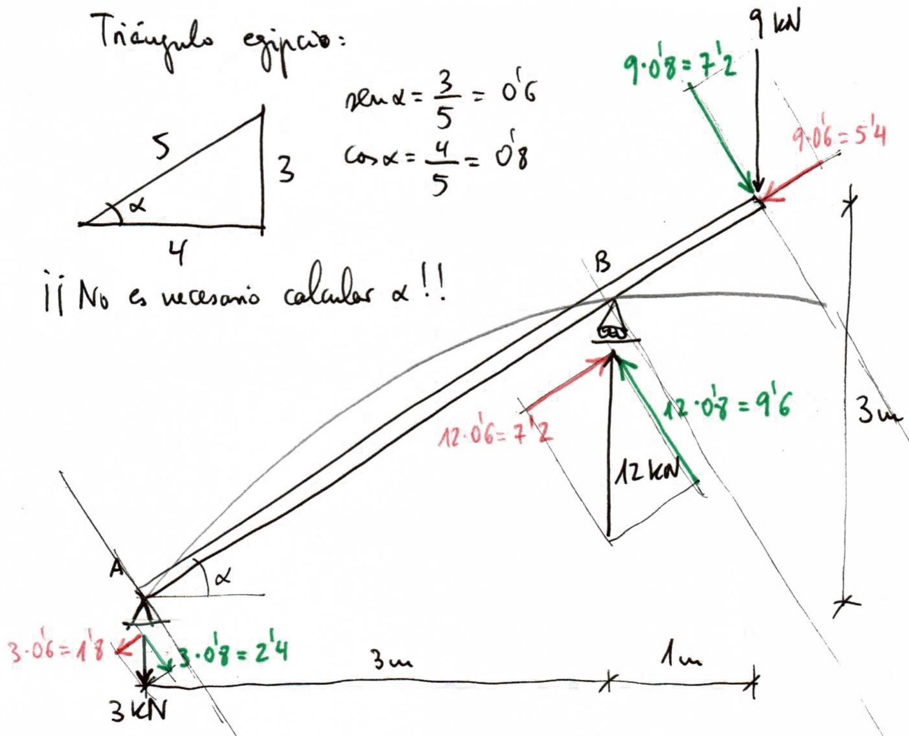
$$M_{max} = M(x_{max}) = M(1'89) = \cdots = 60'2 \text{ kNm}$$

Triángulo egipcio:

$\operatorname{sen}\alpha = \frac{3}{5} = 0'6$

$\cos\alpha = \frac{4}{5} = 0'8$

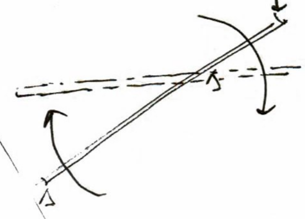
¡¡ No es necesario calcular α !!



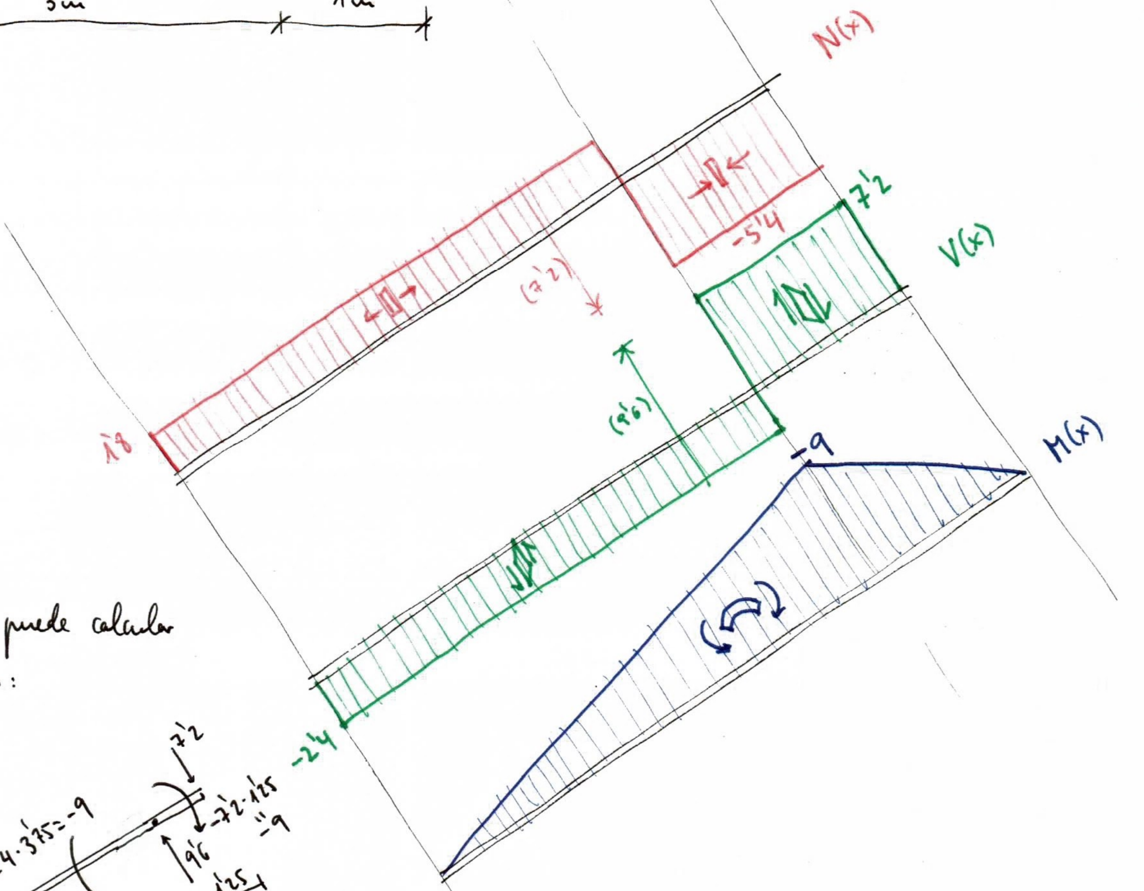
$\Sigma M_A = 0 \Rightarrow -9\cdot 4 + R_B \cdot 3 = 0 \Rightarrow \boxed{R_B = 12\ kN}$

$\Sigma F_y = 0 \Rightarrow -R_A + 12 - 9 = 0 \Rightarrow \boxed{R_A = 3\ kN}$

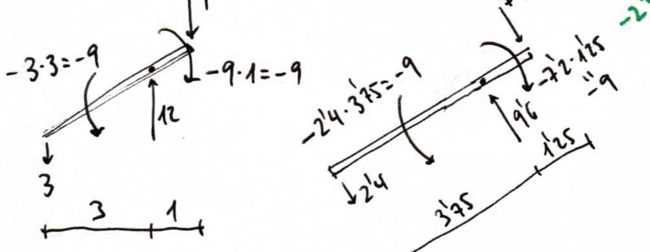
Reacción en A es de "arrancamiento", porque la carga en el voladizo hace palanca



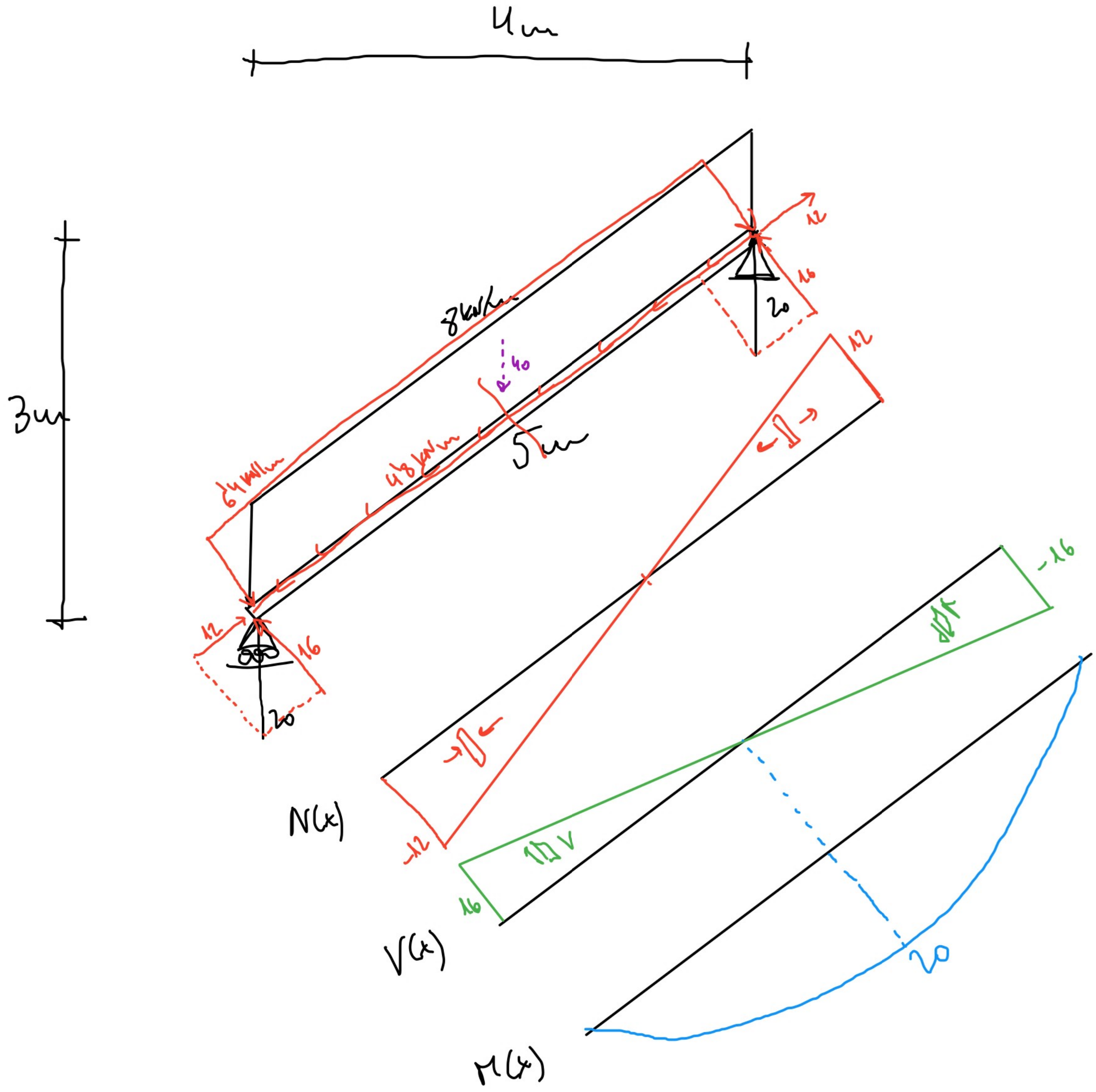
Comprobación: $\Sigma M_B = 3\cdot 3 - 9\cdot 1 = 0$ ✓

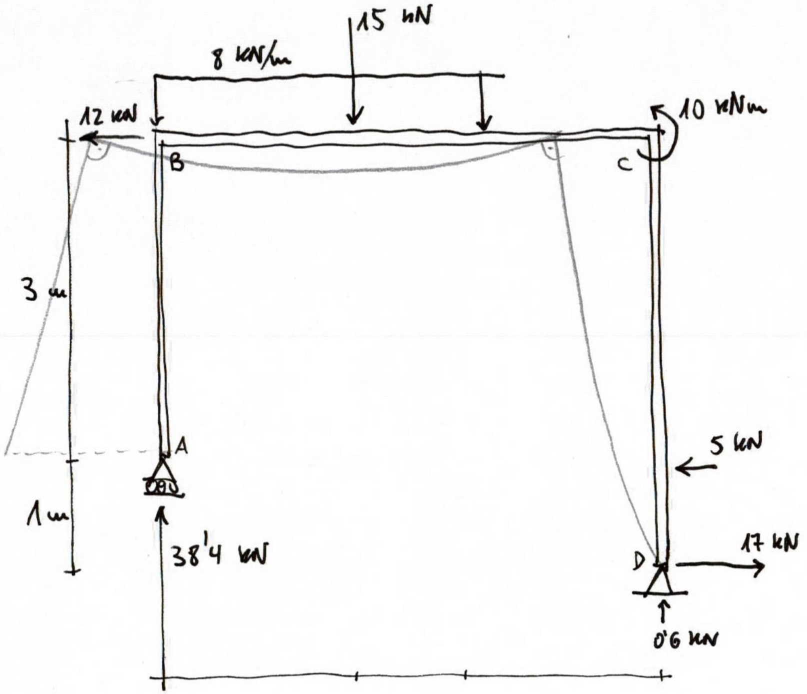


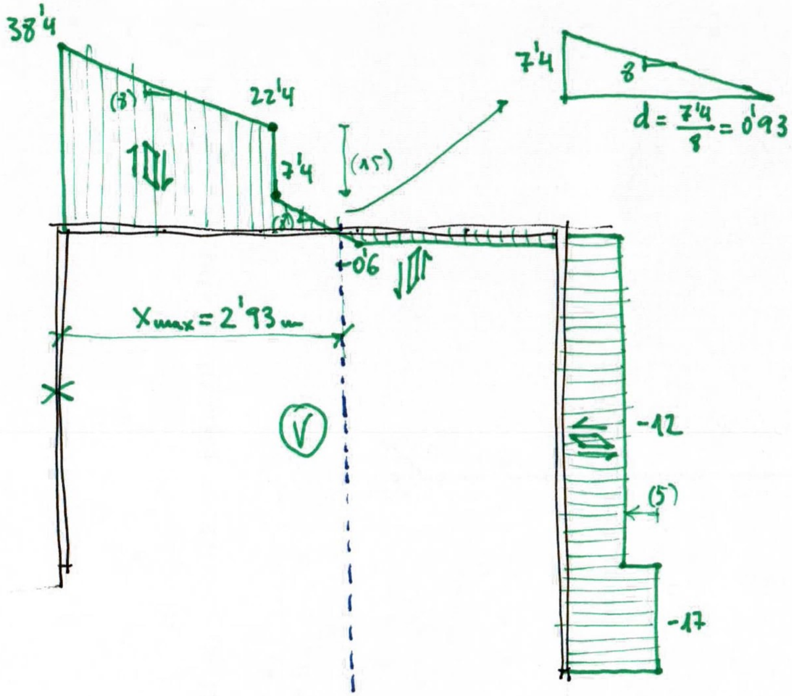
El momento máximo se puede calcular en recto o en inclinado:



Más fácil en recto

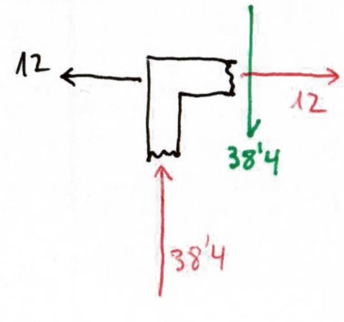

4m
3m
5m
8kN/m
6,4kN/m
4,8kN/m
40
12
16
20
12
16
20
12
-12
-16
16
20
N(x)
V(x)
M(x)

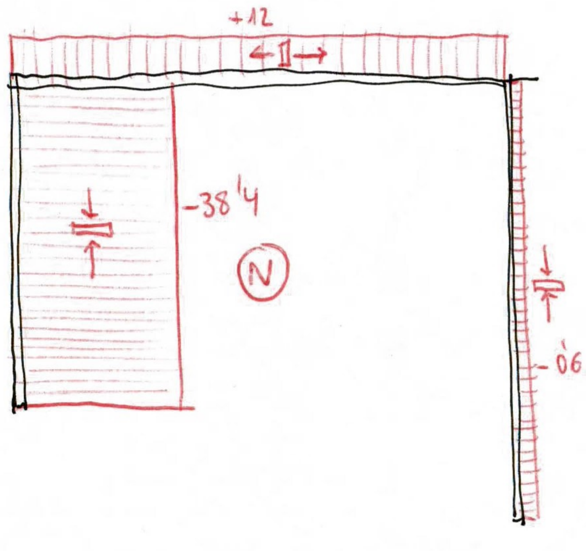


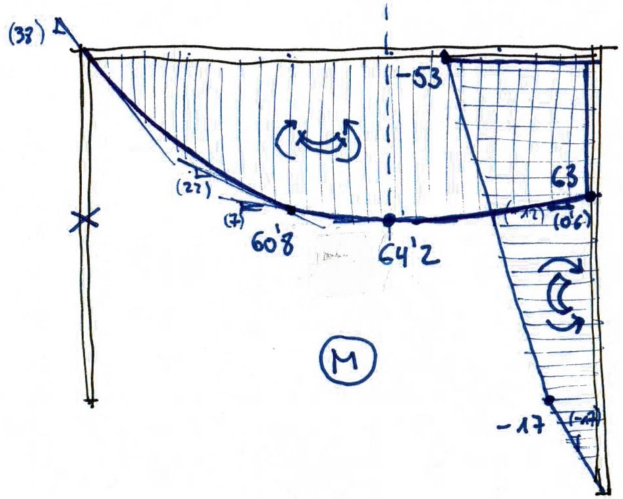


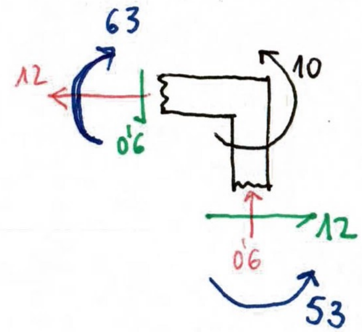
Comprobación de equilibrio de nudos:

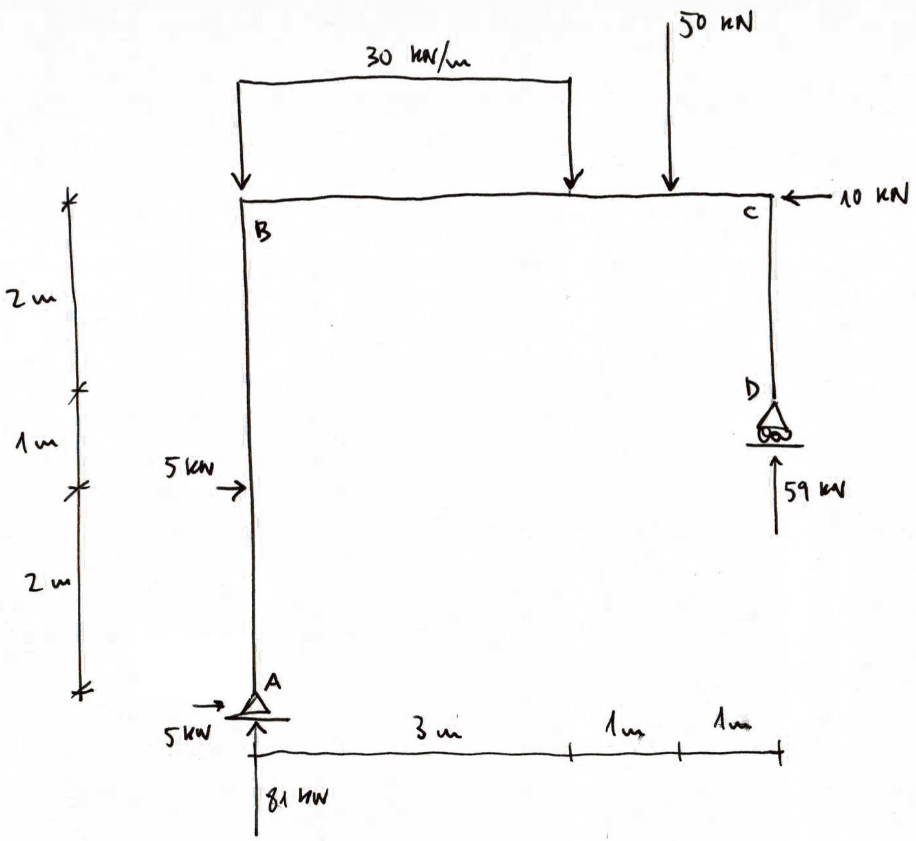
Nudo B :



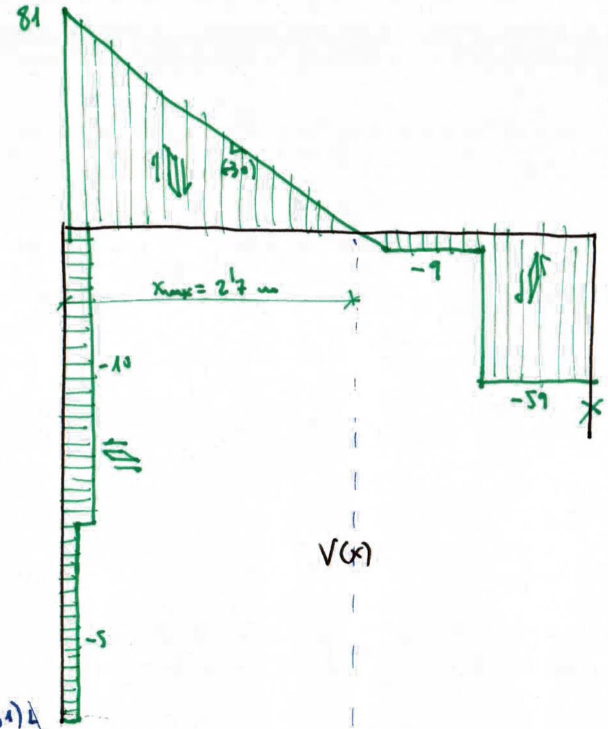




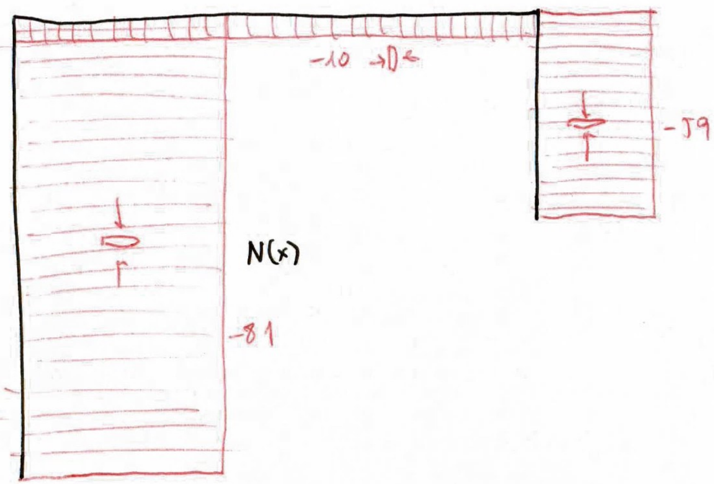




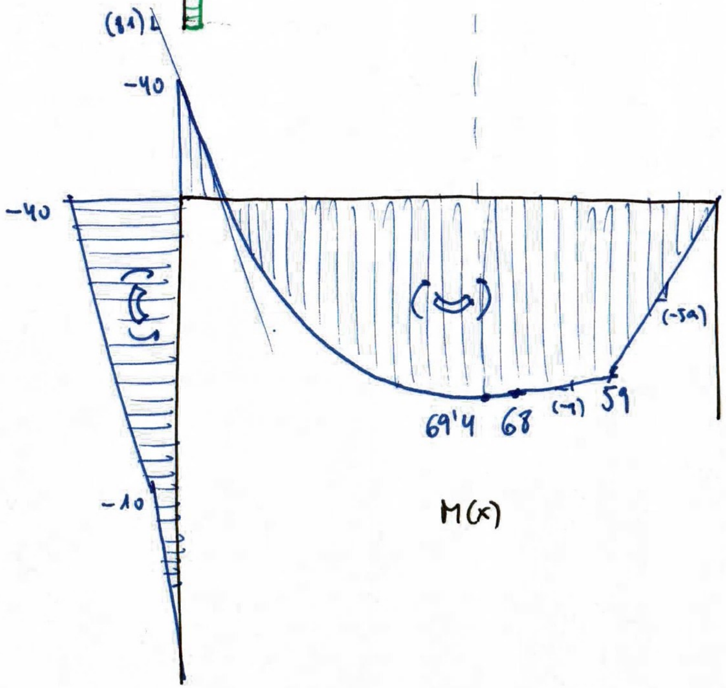
30 kN/m
50 kN
10 kN
B
C
D
A
2 m
1 m
2 m
5 kN
5 kN
59 kN
81 kN
3 m
1 m
1 m



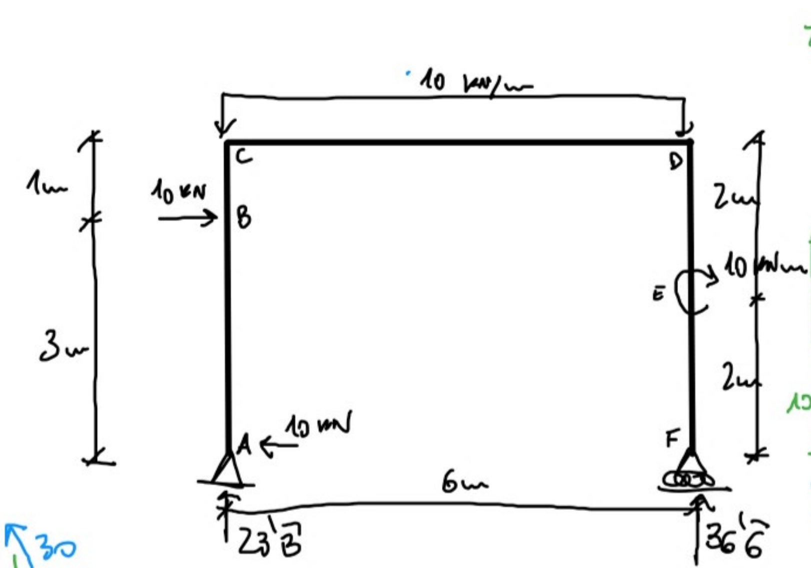
81
(30)
x_max = 2'7 m
-9
-59
-10
-5
V(x)

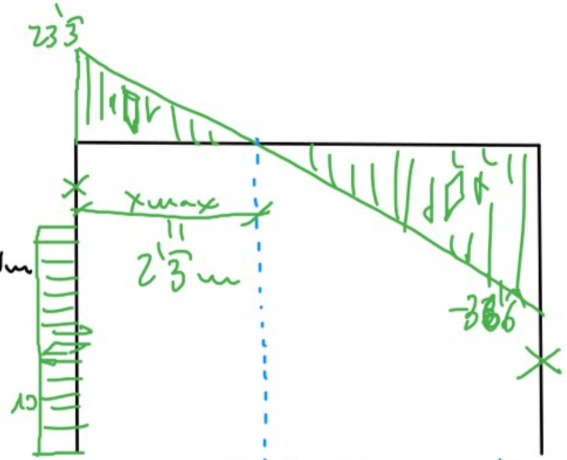


-10
-59
-81
N(x)



(81)
-40
-40
-10
(-59)
69'4
68
(-9)
59
M(x)

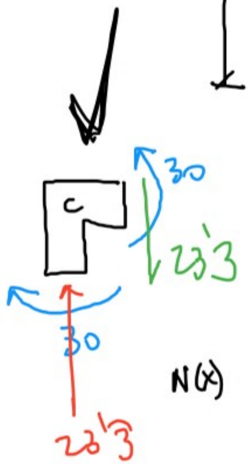




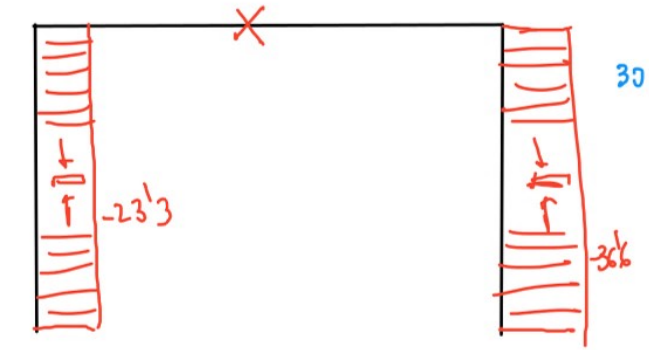
V(x)

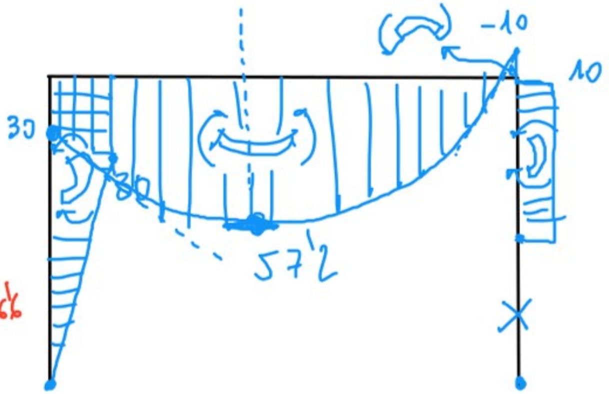
$$M(D) = +30 + 23'3 \cdot 6 - 10 \frac{6^2}{2} = = -10$$

$$M^+_{max} = M(2'3) = 30 + 23'3 \cdot 2'3 - 10 \cdot \frac{2'3^2}{2} = 57'2 \text{ kNm}$$

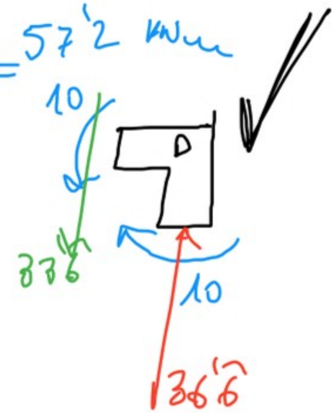


N(x)





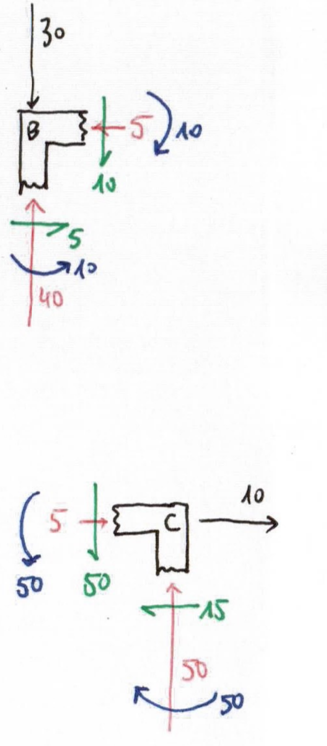
M(x)

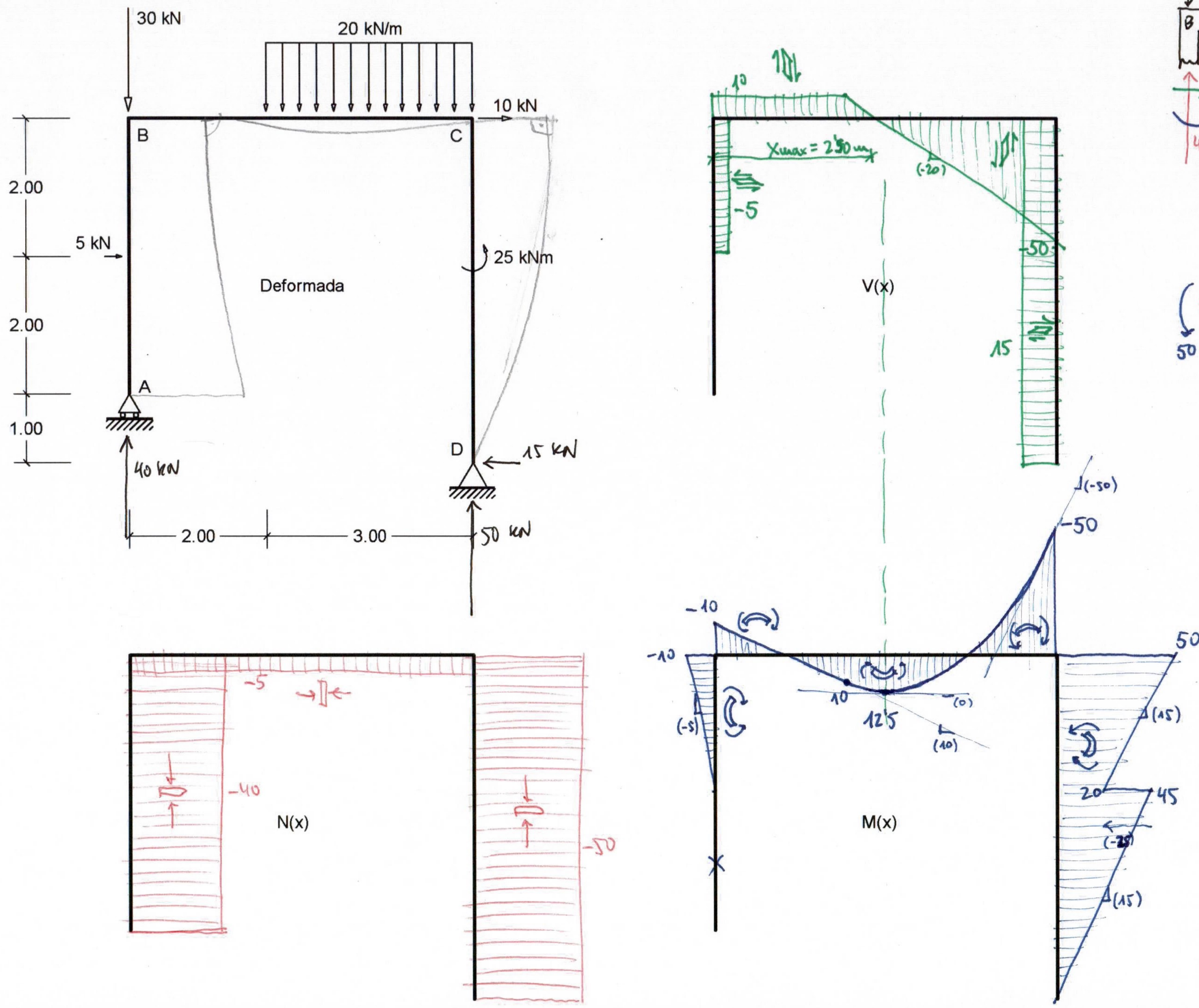


FUNDAMENTOS DE ESTRUCTURAS - 2021/22 - GRUPO C - CONTROL DE SOLICITACIONES - 14/09/21

APELLIDOS Y NOMBRE:

Obtén los diagramas de solicitaciones (axil, cortante y momento) y la deformada aproximada

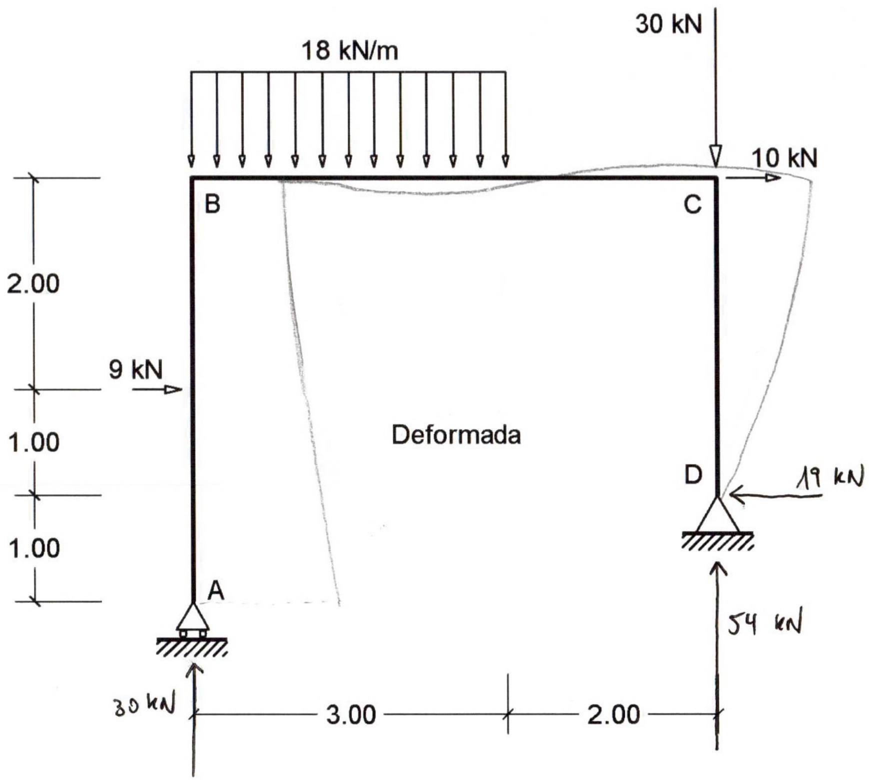


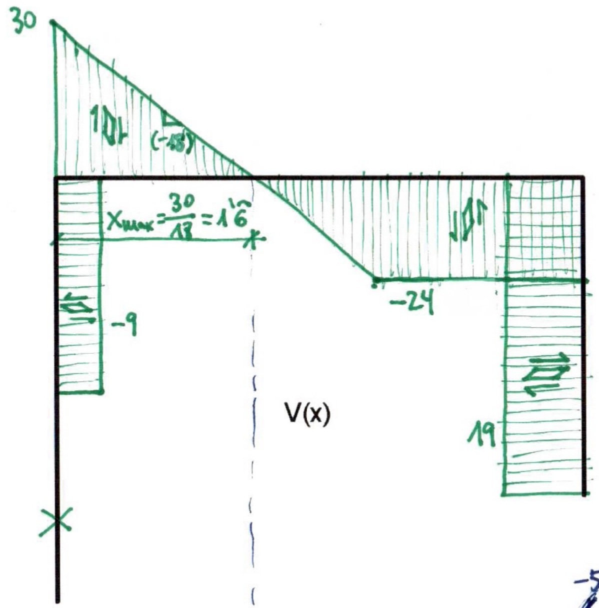


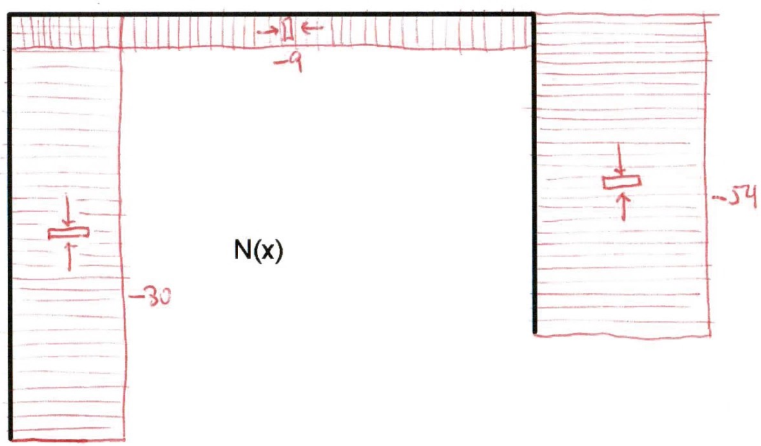
FUNDAMENTOS DE ESTRUCTURAS - 2022/23 - GRUPO C - CONTROL DE SOLICITACIONES - 06/10/22

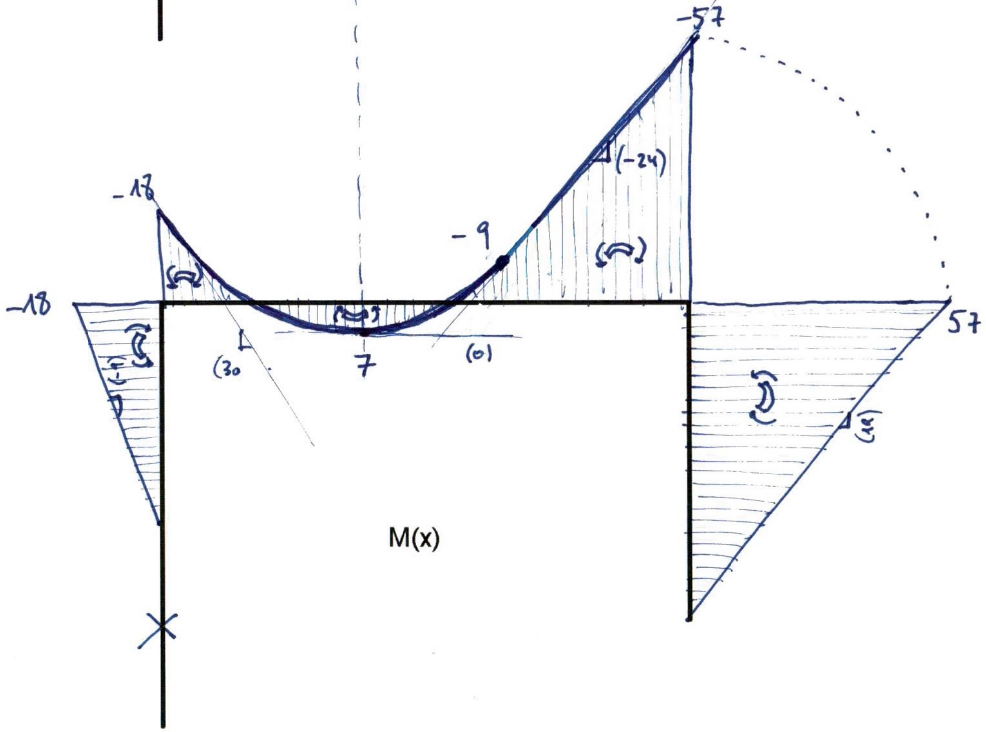
APELLIDOS Y NOMBRE:

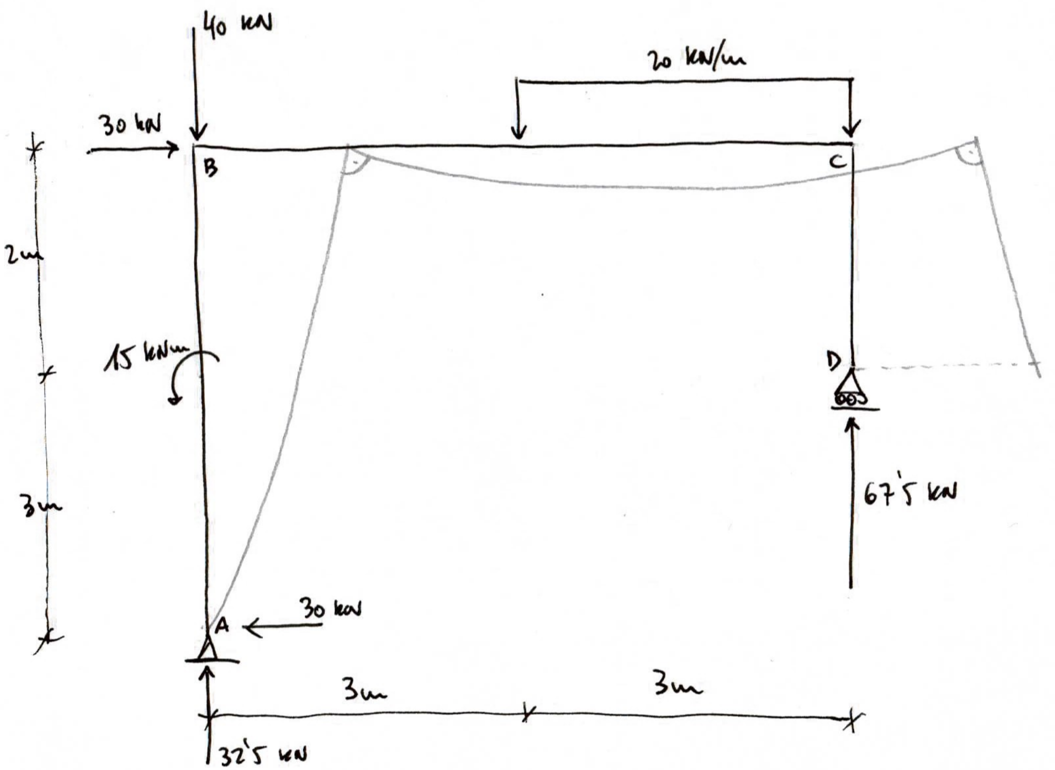
Obtén los diagramas de solicitaciones (axil, cortante y momento) y la deformada aproximada

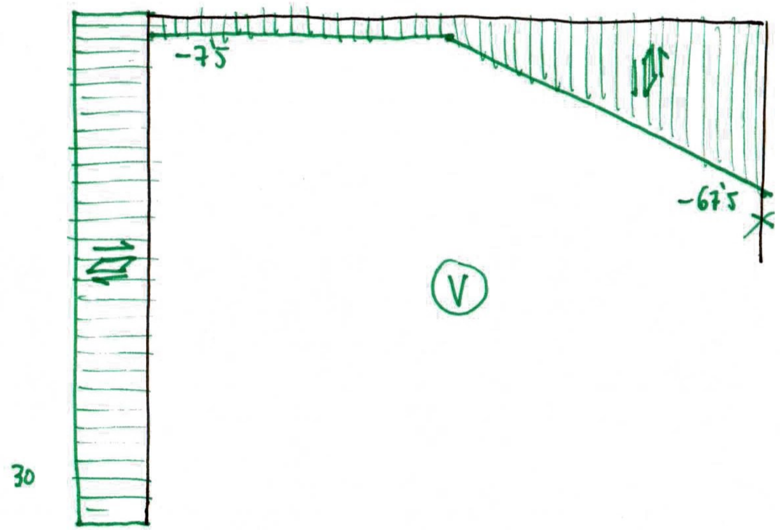


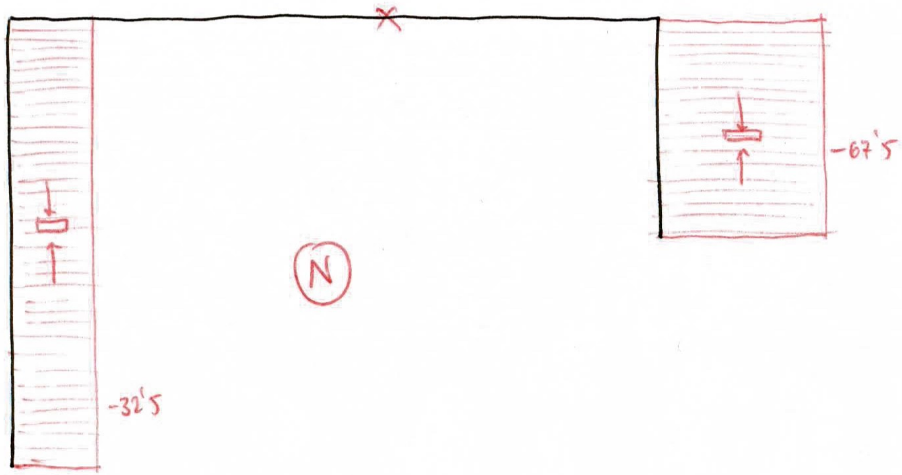


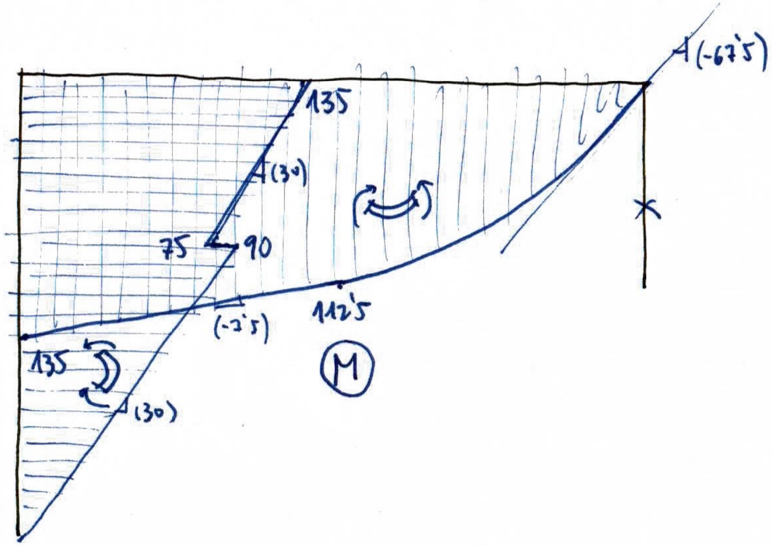


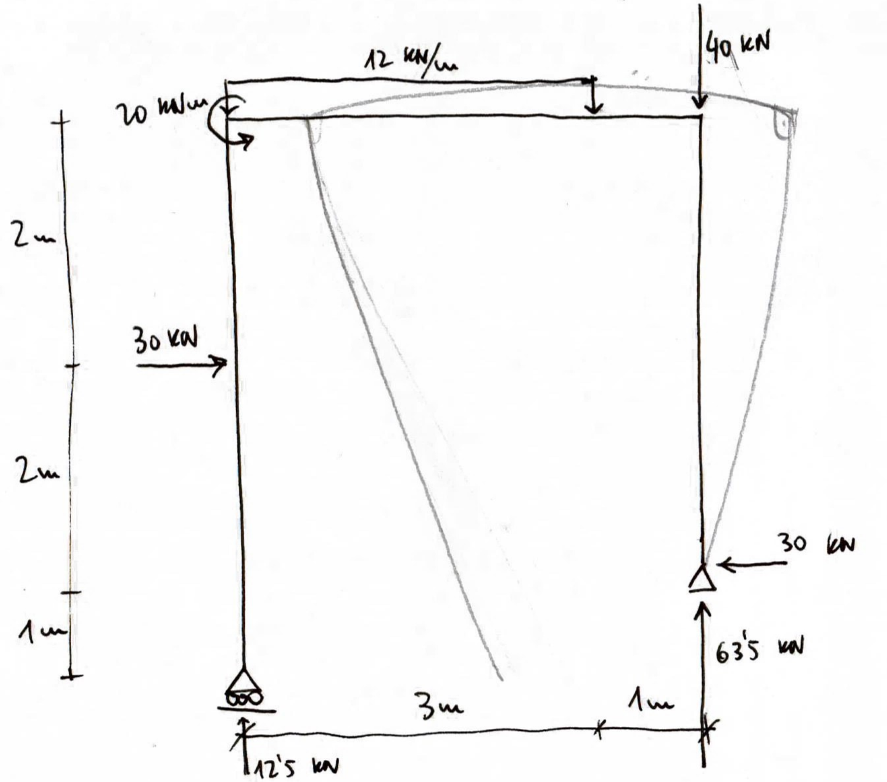


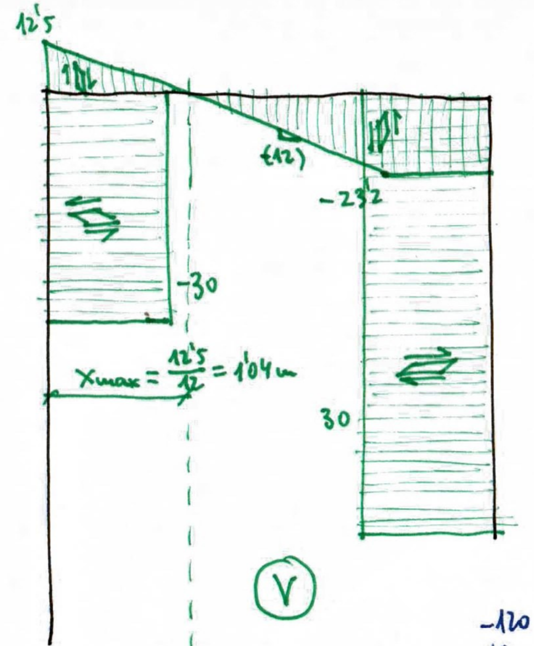

40 kN
20 kN/m
30 kN
B
C
2m
15 kNm
D
3m
67'5 kN
30 kN
A
3m
3m
32'5 kN

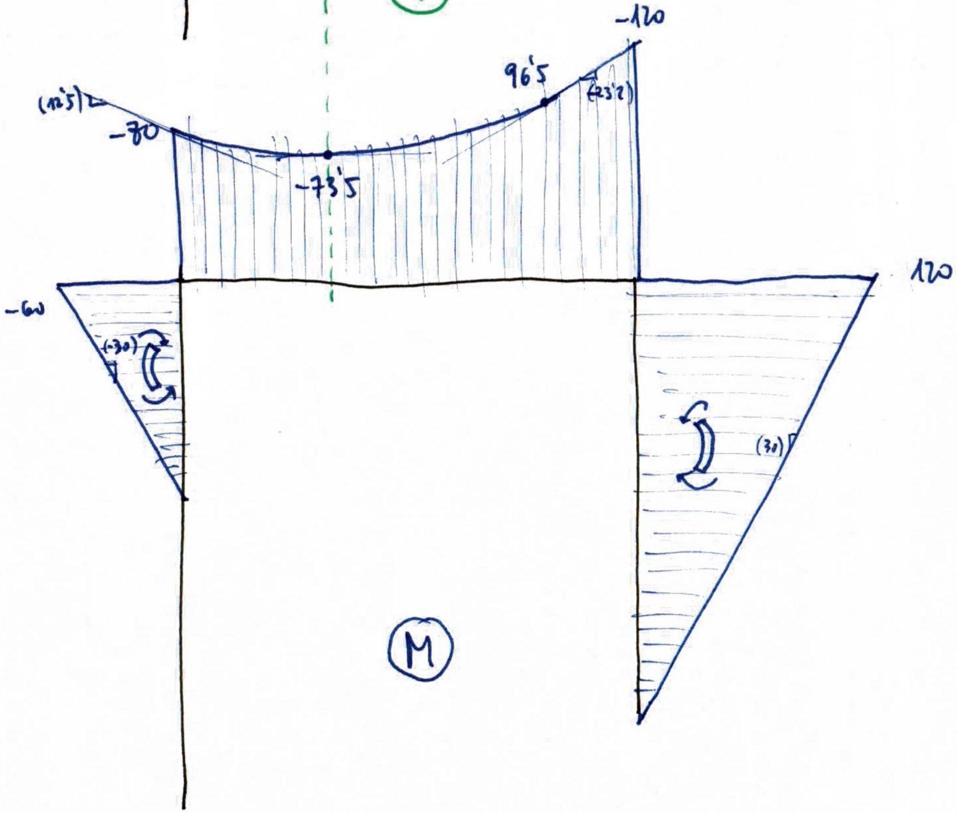

-7'5
-67'5
30
V

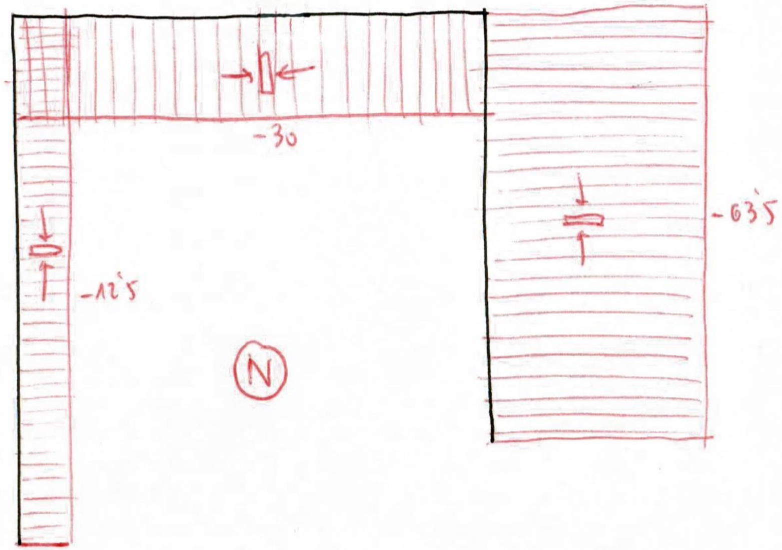

-67'5
-32'5
N

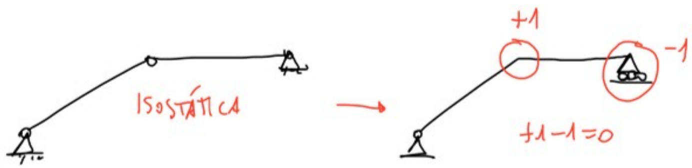

(-67'5)
135
(30)
75
90
112'5
(-2'5)
135
(30)
M

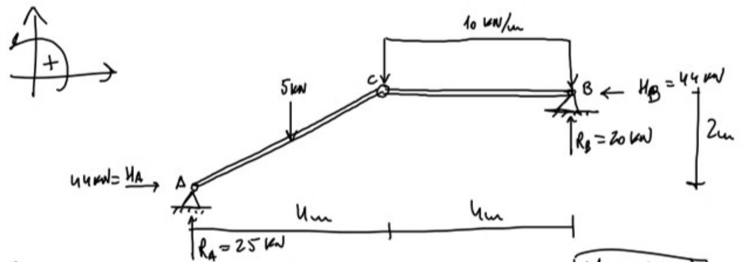

40 kN
12 kN/m
20 kNm
2 m
30 kN
2 m
1 m
30 kN
63'5 kN
3 m
1 m
12'5 kN


12'5
(12)
-23'2
-30
Xmax = 12'5/12 = 1'04 m
30
V


-120
96'5
(23'2)
(12'5)
-80
-73'5
-60
(-30)
120
(30)
M

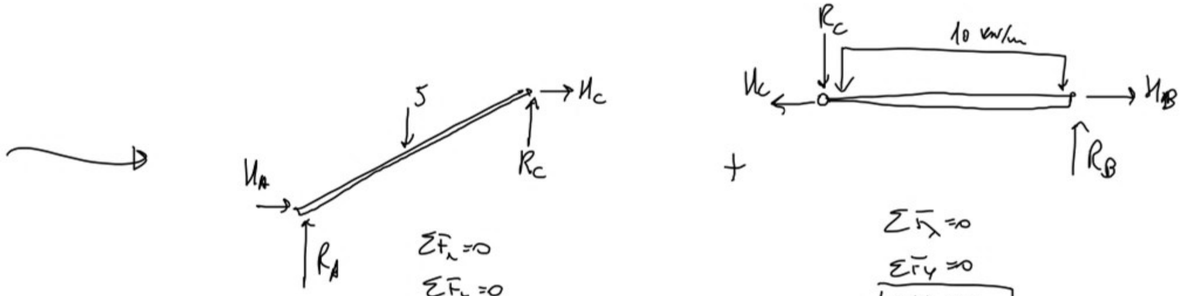

-30
-63'5
-12'5
N





4 Incógnitas: $\begin{cases} R_A \\ H_A \\ R_B \\ H_B \end{cases}$

4 Ecs. $\begin{cases} \Sigma F_x = 0 \Rightarrow H_A - H_B = 0 \Rightarrow H_B = \boxed{H_A = 44\ kN} \\ \Sigma F_y = 0 \Rightarrow R_A + R_B = 45 \Rightarrow \boxed{R_B = 25\ kN} \\ \Sigma M_A = 0 \Rightarrow -5\cdot 2 - (10\cdot 4)\cdot 6 + R_B\cdot 8 + H_B\cdot 2 \longrightarrow \boxed{H_B = 44\ kN} \\ \Sigma M_{rót,dch} = 0 \Rightarrow -(10\cdot 4)\cdot 2 + R_B\cdot 4 = 0 \Rightarrow \boxed{R_B = 20\ kN} \end{cases}$



$\Sigma F_x = 0$
$\Sigma F_y = 0$
$\Sigma M_A = 0$

$\Sigma F_x = 0$
$\Sigma F_y = 0$
$\boxed{\Sigma M_C = 0}$

$\left.\begin{array}{l} 6 \text{ ecs.} \\ 6 \text{ incóg.} \end{array}\right\}$ Resoluble