EJERCICIOS

Nombre del Alumno: José Trinidad López Domínguez

Nombre del tema:
MÉTODOS ENERGÉTICOS

Parcial: 1°

Nombre de la Materia:
Análisis de Estructuras

Nombre del profesor: Arq. Perla Marisol Barajas

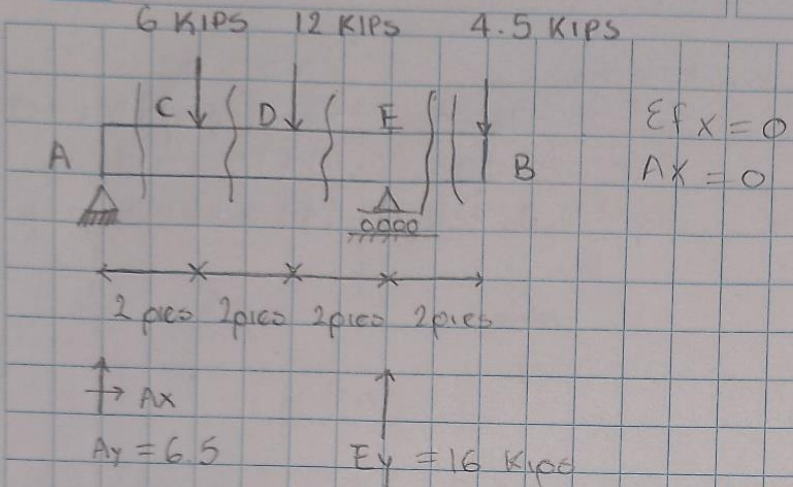Nombre de la Licenciatura: Arquitectura

Cuatrimestre: 5to

Fecha: Comitán de Domínguez a 15 de febrero de 2025

1

$(\ \ )\ 4$

6 KIPS   12 KIPS   4.5 KIPS

A — C — D — E — B

$\Sigma f_x = 0$
$A_x = 0$

2 pies 2 pies 2 pies 2 pies

$\rightarrow A_x$

$A_y = 6.5$ $E_y = 16\ Kips$

$\Sigma M_A = 0$

$-4.5\ Kips\,(8\,pies) + E_y\,(6\,pies) - 12\,Kips\,(4\,pies) - 6\,kips\,(2\,pies) = 0$

$-36\ Kips\cdot pies + E_y\,(6\,pies) - 48\ Kips\cdot pies - 12\ Kips\cdot pies = 0$

$-96\ Kips\cdot pies + E_y\,(6\,pies) = 0$

$E_y\,(6\,pies) = +96\ Kips\cdot pies$

$E_y = \dfrac{-96\ Kips\cdot pies}{6\ pies} = -16\ Kips$

$E_y = 16\ kips$

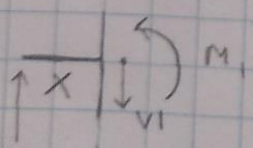$\Sigma f_y = 0$

$A_y - 6\,Kips - 12\,Kips + 16\,Kips - 4.5\,Kips = 0$

$A_y - 6.5\,Kips = 0$

$A_y = 6.5\,Kips$

SISTEMA REAL

CORTE 1

INTERVALO
$0 \leq X \leq 2$

$\Sigma f_y = 0$
$6.5 - V_1 = 0$
$V_1 = 6.5\ Kips$
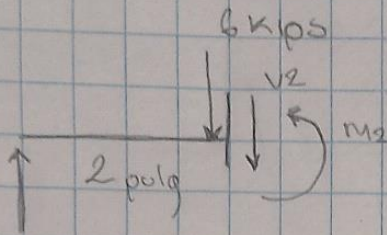
$\Sigma M_O = 0$
$M_1 - 6.5\,(x)$
$M = 6.5x$

Estrella

CORTE 2

6 Kips
V_2
M_2
2 pulg
6.5 Kips

$\Sigma F_y = 0$
$6.5 - 6 - V_2 = 0$
$0.5 - V_2 = 0$
$V_2 = 0.5$ Kips

$\Sigma M_0 = 0$
$-6.5(2\,pulg) + M_2 = 0$
$-13 + M_2 = 0$
$M_2 = 13$ Kips·pulg

CORTE 3

6   12
2 pul 2 pol V_3 M_3
6.5 Kips
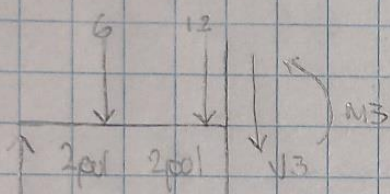
$\Sigma F_y = 0$
$6.5 - 6 - 12 - V_3 = 0$
$-11.5 - V_3 = 0$
$V_3 = -11.5$ Kips

$\Sigma M_0 = 0$
$-6.5(4) + (6)(2) + M_3 = 0$
$-14 + M_3 = 0$
$M_3 = 14$ Kips·pulg

CORTE 4

6   12
2'   2   2 V_4 M_4
6.5 Kips   15 Kips
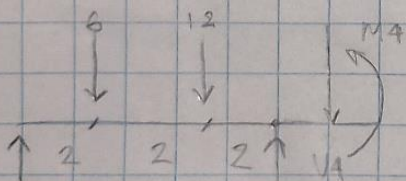
$\Sigma F_y = 0$
$6.5 - 6 - 12 + 16 - V_4 = 0$
$4.5 - V_4 = 0$
$V_4 = 4.5$ Kips

$\Sigma M_0 = 0$
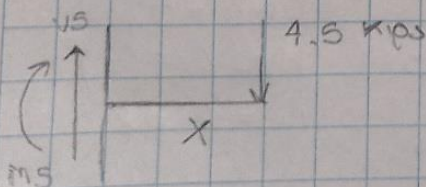$-6.5(6) + 6(4) + 12(2)$
$+ M_4 = 0$
$-39 + 24 + 24 + M_4 = 0$
$9 + M_4 = 0$
$M_4 = -9$ Kips·pul

CORTE 5

V_5 4.5 Kips
X
M_5

$\Sigma F_y = 0$
$V_5 - 4.5 = 0$
$V_5 = 4.5$ Kips

$\Sigma M_0 = 0$
$M_5 = X$

2

$F = 50\ KN$

60 KN   **25 KN/m**

A   C↓   D↓↓↓↓↓ B

AX △

Ay 2m   1m   2m $By = 64\ KN$

$46\ KN$

CORTE 2

60KN   M2

↑   ↓ V2

$= 46\ KN$

② $F = B \times h = 2m \times 25\dfrac{KN}{m} = 50\ KN$

+) $\Sigma M_A = 0$

$By(5m) - 50\ KN/m(4m) - 60\ KN(2m) = 0$

$By(5m) - 200\ KN/m - 120\ KN \cdot m = 0$

$By(5m) - 320\ KN/m = 0$

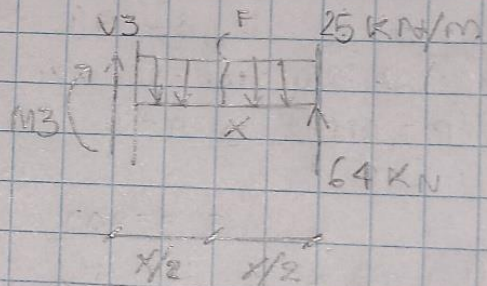$By = \dfrac{320\ KN/m}{5m} = -64\ KN$

$By = 64\ KN$

+↑ $\Sigma F_y = 0$
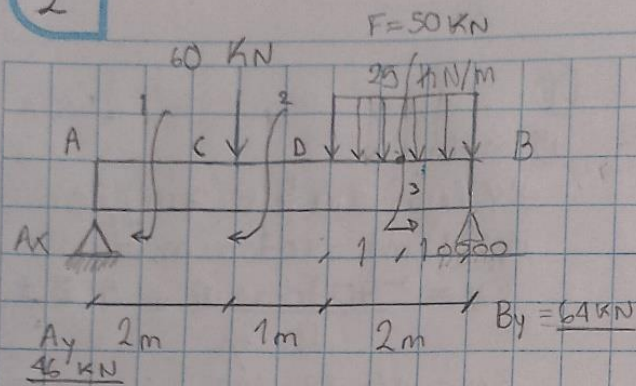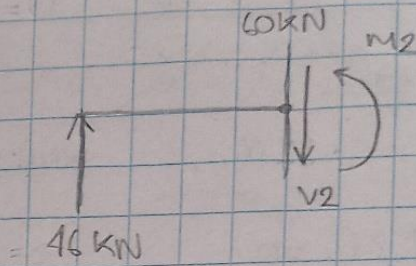
$Ay = -60\ KN - 50\ KN + 64\ KN = 0$
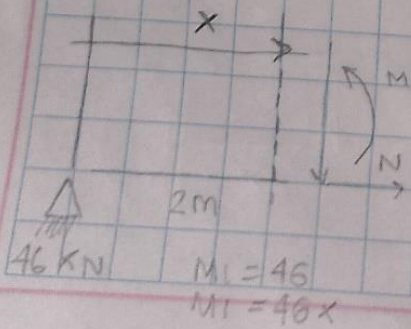
$Ay = -46\ KN$

$Ay = 46\ KN$

1) $\Sigma F_y = 0$

$46x - 60x - V2 = 0$

$V2 = -14\ KN$

2) $\Sigma M_0 = 0$

$-46(2) + M2 = 0$

$M2 = 92\ KN \cdot M$

CORTE 3

V3   F   25 KN/m

M3

64 KN

x/2   x/2

$M3 = 64x - 25\ K/m(m)(x/2)$

$M3 = 64x - 25\ K/m \cdot x^2$

SISTEMA REAL
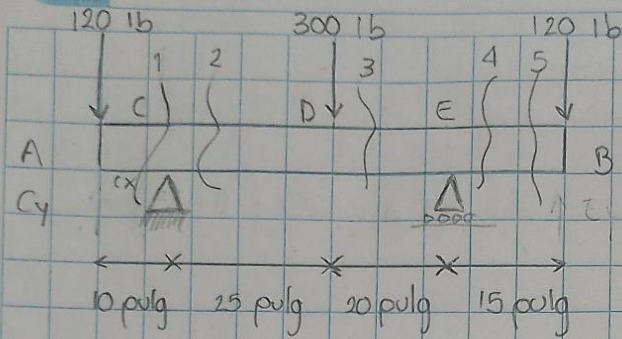
X

2m

46 KN $M_1 = 46$

$M_1 = 46x$

CORTE 1

INTERVALO

$0 \leq x \leq 2$

1) $\Sigma F_y = 0$

$46\ KN - V_1 = 0$

$V_1 = 46\ KN$

$\Sigma M_0 = 0$

$M_1 = 46\ KN(x) = 0$

$M_1 = 46x$

③

120 lb   300 lb   120 lb

A
C_y

```
        1  2      3      4  5
    ↓C)    D↓    E)      ↓
                              B
   (x)△            △
```

10 pulg   25 pulg   20 pulg   15 pulg

① $\Sigma M_C = 0 \; (-) + M = F \times D$

$\Sigma M = 0$ $C_y = 186 \cdot 67\,lb$ $E_y = 353.33\,lb$

$\Sigma M_A =$

$-120\,lb(10\,pulg) - 300(25\,pulg) + E_y(45\,pulg) - 120(60) = 0$

$-1200\,lb/pulg - 7,500\,lb \cdot pulg + E_y(45\,pulg) - 7,200\,lb \cdot pulg = 0$

$E_y(45\,pulg) - 15,900\,lb \cdot pulg$

$E_y = \dfrac{-15,900\,lb \cdot pulg}{45\,pulg} = -300\,lb$

$E_y = 353.33\,lb$

$\Sigma F_y = 0$

$-120\,lb + C_y - 300\,lb + 353.33\,lb - 120\,lb = 0$

$(-353.33\,lb + C_y = 0$

$C_y = 186.67\,lb$

SISTEMA REAL

CORTE 1   INTERVALO

                $0 \leq x \leq 10$

120

$\Sigma F_y = 0$ $\Sigma M_0 = 0 \; (-)$

$-120 - V_1 = 0$ $M_1 = 120\,(x)$

$V_1 = -120\,lb$, $M_1 = 120\,x$

CORTE 2

120 ton

M2

X

V2

186.67 lb
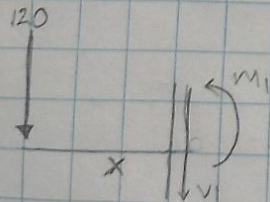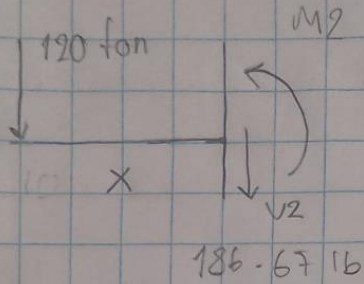
INTERVALO

$0 \le X \le 10$

$$M_2 = 186.67 \, X - 120 \, (X - 25)$$

CORTE 3

120

300

M3

V3

184.87 LB

INTERVALO

$0 \le X \le$

$$M_3 = 353.3\%b \, X - 300 \, lb$$

CORTE 4

M4

V4

CORTE 5

V5

X

M5

④

48 ton/m

W = 8 ton/m

A   B

8m

12 m
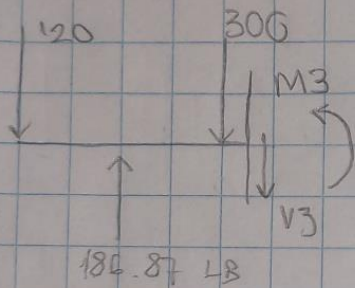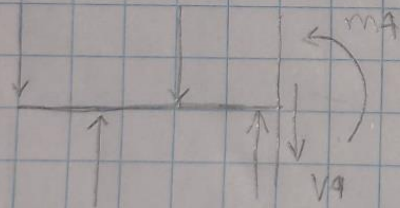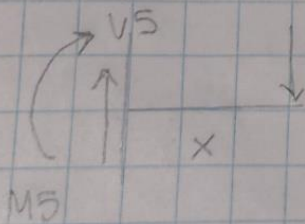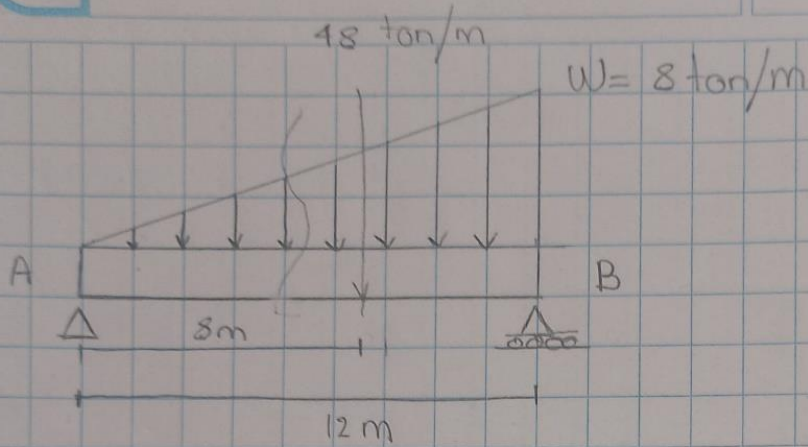
$$\frac{12\,m\,(8\,ton/m)}{2} = \frac{96\,ton/m^2}{2} = 48\,ton/m$$

$\Sigma M = 0$

$+\circlearrowright \Sigma M_A =$

$B_y\,(12\,m) - 48\,ton/m\,(8\,m) = 0$

$B_y\,(12\,m) - 384\,ton/m^2 = 0$

$B_y\,(12\,m) - 384\,ton/m^2$

$B_y = \dfrac{384\,ton/m^2}{12\,m}$

$\underline{B_y = 32\,ton/m}$

$+\uparrow F_y = 0$

$A_y - 48\,ton/m + 32\,ton/m = 0$

$A_y - 16\,ton/m = 0$

$A_y = 16\,ton/m$

SISTEMA REAL

$0 \leq x \leq 12$

8 ton/m

By

x

$8x\,(x/2)$

$\dfrac{8x^2}{2} = 4x^2$

$M_1 = 8x - P\,(x-2)$

$48\,ton/m\,(8)\,(x/2)$

$48\,ton/m\,x\,4x^2$