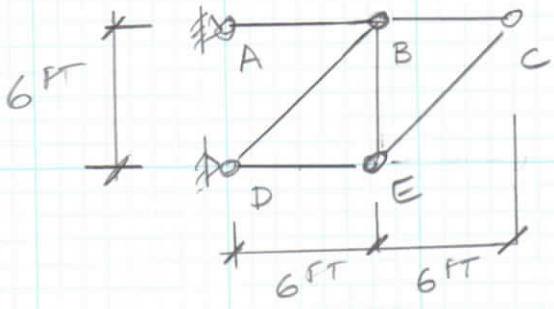
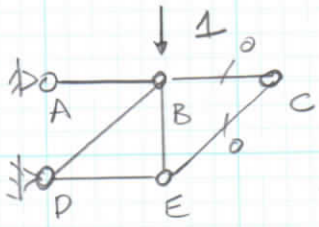
1.

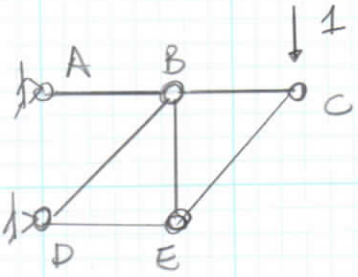


A) UNIT LOAD AT B

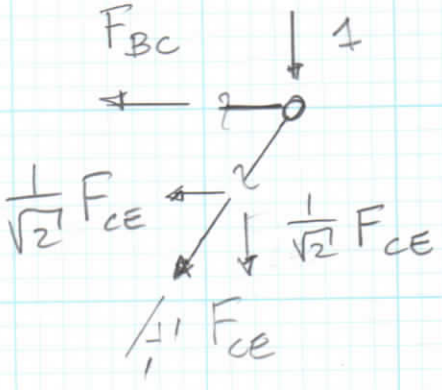


$F_{CE} = 0$

B) UNIT LOAD AT C



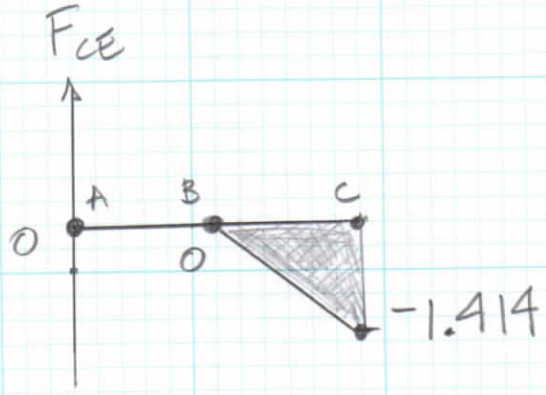
FBD OF JOINT C



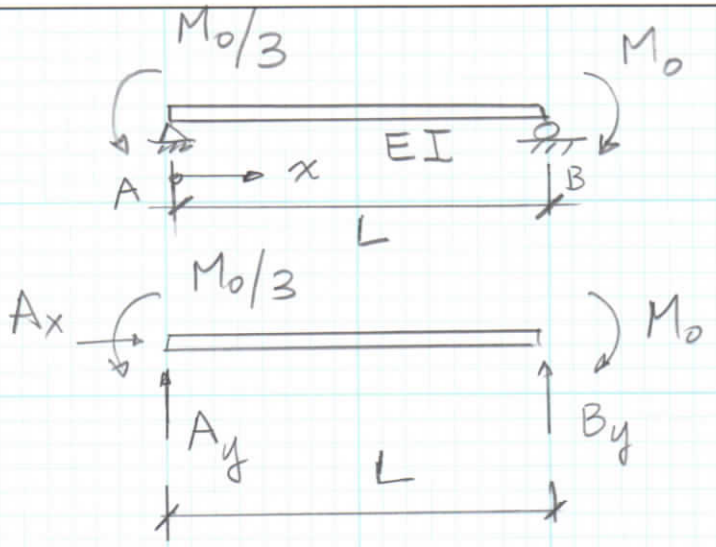
$+\uparrow \sum F_y = 0$

$-1 - \frac{1}{\sqrt{2}} F_{CE} = 0$

$F_{CE} = -\sqrt{2} = -1.414$



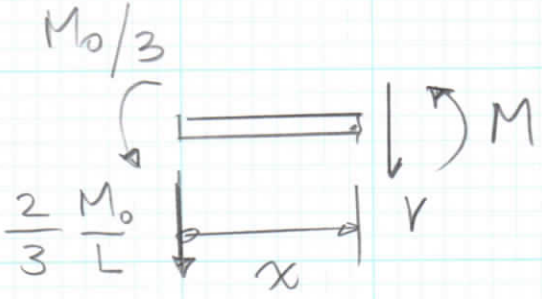
2.



A. $\circlearrowleft \Sigma M_B = 0$

$$M_o/3 - M_o - A_y(L) = 0$$

$$A_y = -\frac{2}{3}\frac{M_o}{L}$$



$\circlearrowleft \Sigma M_x = 0$

$$\frac{M_o}{3} + \frac{2}{3}\frac{M_o}{L}x + M = 0$$

$$\therefore \boxed{M = -\frac{M_o}{3} - \frac{2}{3}\frac{M_o}{L}x}$$

$$M = -\frac{2}{3}\frac{(18)}{15}x - \frac{18}{3}$$

$$\therefore \boxed{M = -0.8x - 6}$$

B. $EI\frac{d^2y}{dx^2} = M$

$$EI\frac{d^2y}{dx^2} = -0.8x - 6$$

$$100\frac{d^2y}{dx^2} = -0.8x - 6$$

$$100(\theta) = \frac{-0.8x^2}{2} - 6x + C_1$$

$$100(y) = \frac{-0.8x^3}{6} - 6\left(\frac{x^2}{2}\right) + C_1x + C_2$$

$y(0) = 0$

$$\boxed{0 = C_2}$$

$y(L) = 0$

$$0 = \frac{-0.8(L^3)^2}{6} - 6\left(\frac{L^2}{2}\right) + C_1L$$

$$C_1 = 6\left(\frac{L}{2}\right) + 0.8\left(\frac{L^2}{6}\right)$$

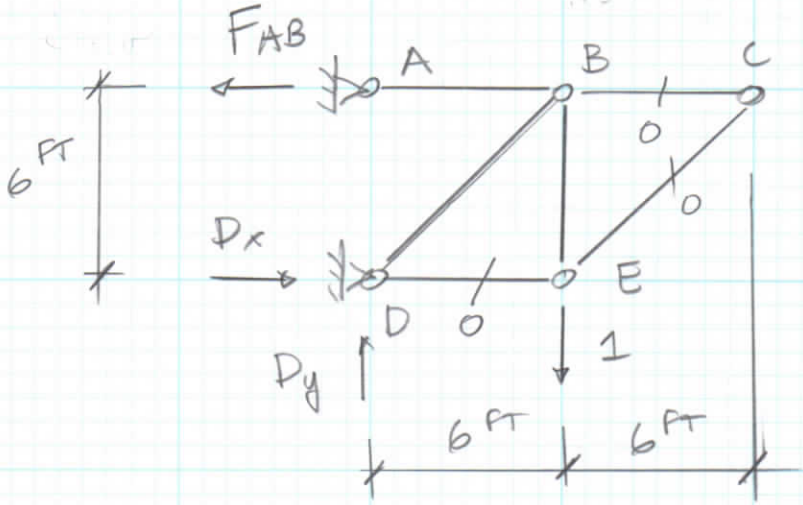
$$\boxed{C_1 = 75}$$

2.B (CONT)

$$100y = \frac{-0.8}{6}x^3 - \frac{6}{2}x^2 + \cancel{C_1}^{75}x + \cancel{C_2}^{0}$$

$$\therefore \boxed{y = -0.001333x^3 - 0.03x^2 + 0.75x}$$

3.

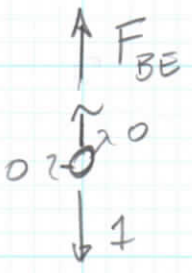


VIRTUAL SYSTEM TO MEASURE δ_{EV}

$$\circlearrowleft \Sigma M_D = 0 \quad -F_{AB}(6^{FT}) - 1(6^{FT}) = 0$$

A) $\boxed{F_{AB} = 1}$

B)

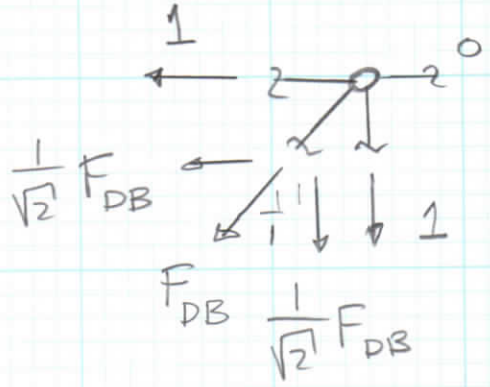


$$+\uparrow \Sigma F_y = 0$$

$$F_{BE} - 1 = 0 \qquad \boxed{F_{BE} = 1}$$

C) $\boxed{F_{DE} = 0}$

3. D/E FBD OF JOINT B



$$\Sigma F_x = 0 \qquad -1 - \frac{1}{\sqrt{2}} F_{DB} = 0$$

$$F_{DB} = -\sqrt{2} = -1.414$$

1. $\delta_{EV} = \sum F_Q \alpha \Delta T L$

$$= \left(-\sqrt{2}\right)\left(5.0\times10^{-5}\ /{}^{\circ}F\right)\left(130\ {}^{\circ}F\right)\left(6\sqrt{2}\ FT\right)\left(\frac{12\ IN}{FT}\right)$$

$$\delta_{EV} = -0.936\ IN$$

↑ OPPOSITE VIRTUAL LOAD DIRECTION

$$\therefore \boxed{\delta_{EV} = 0.936\ IN \quad UP}$$