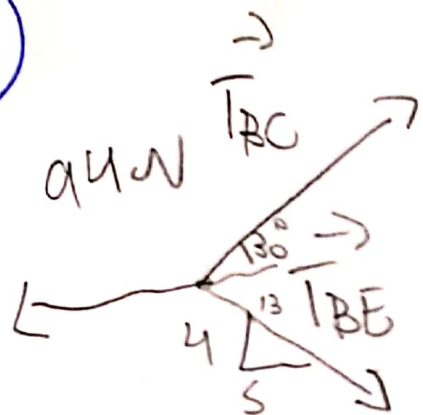


①



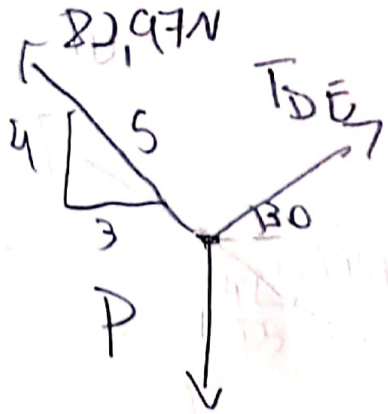
$$\sum F_x = 0: T_{BC} \cos(30) + \frac{T_{BE} \cdot 3}{5} - 94 = 0$$

$$\boxed{\frac{\sqrt{3}}{2} T_{BC} + \frac{3 T_{BE}}{5} = 94}$$

$$\sum F_y = 0: T_{BC} \sin(30) - T_{BE} \left(\frac{4}{5} \right) = 0$$

$$\boxed{\frac{T_{BC}}{2} = \frac{4 T_{BE}}{5}}$$

$$\frac{\sqrt{3} \cdot 4 T_{BE}}{5} + \frac{3 T_{BE}}{5} = 94 \Rightarrow T_{BE} \left(\frac{4\sqrt{3}}{5} + \frac{3}{5} \right) = 94 \Rightarrow \boxed{T_{BE} = 52.97 \text{ N}}$$



$$\sum F_x = 0: -82,97 \left(\frac{3}{5} \right) + T_{DE} \cos(30) = 0.$$

$$T_{DE} = \frac{49,782}{\cos(30)} = 57,48$$

$$\sum F_y = 0: T_{DE} \sin(30) + 82,97 \left(\frac{4}{5} \right) - P = 0$$

$$P = 95,11 \text{ N}$$

$$\textcircled{2} \quad A = (0, 0, 6) \quad B = (2, 3, 0) \quad C = (-1, 5, 2) \quad D = (-3, -6, 0)$$

$$\vec{T}_{AB} = |\vec{T}_{AB}| \left(\frac{2}{7}, \frac{3}{7}, \frac{-6}{7} \right) \quad \vec{T}_{AC} = |\vec{T}_{AC}| \left(\frac{1,5}{6,5}, \frac{2}{6,5}, \frac{-6}{6,5} \right)$$

$$\vec{T}_{AD} = |\vec{T}_{AD}| \left(\frac{-3}{9}, \frac{-6}{9}, \frac{-6}{9} \right)$$

$$\sum F_x = 0: \frac{2|\vec{T}_{AB}|}{7} + \frac{3|\vec{T}_{AC}|}{13} - \frac{|\vec{T}_{AD}|}{3} = 0$$

$$\hookrightarrow |\vec{T}_{AD}| = \frac{6|\vec{T}_{AB}|}{7} + \frac{3|\vec{T}_{AC}|}{13}$$

$$\sum F_y = 0: \frac{3|\vec{T}_{AB}|}{7} + \frac{4|\vec{T}_{AC}|}{13} - \frac{2|\vec{T}_{AD}|}{3} = 0$$

$$|\vec{T}_{AC}| = \frac{4}{13} \left(\frac{2|\vec{T}_{AD}|}{3} - \frac{3|\vec{T}_{AB}|}{7} \right)$$

$$|\vec{T}_{AC}| = \frac{4}{13} \left(\frac{2|\vec{T}_{AD}|}{3} - \frac{3|\vec{T}_{AB}|}{7} \right)$$

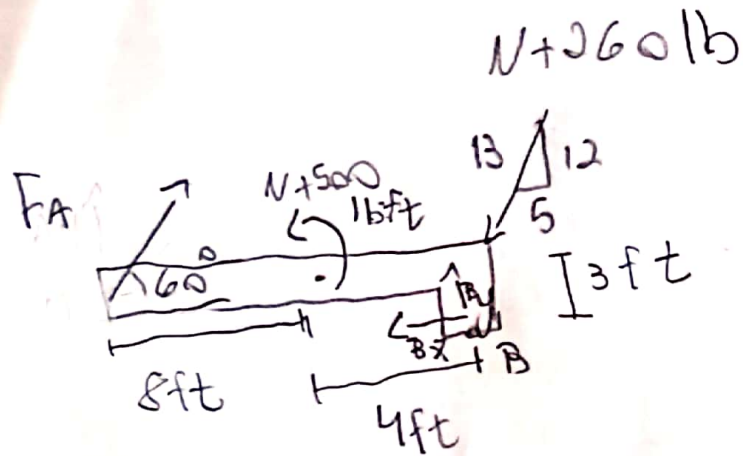
$$|\vec{T}_{AC}| = \frac{8|\vec{T}_{AD}|}{39} - \frac{12|\vec{T}_{AB}|}{91} = \frac{16|\vec{T}_{AB}|}{91} + \frac{8|\vec{T}_{AC}|}{169} - \frac{12|\vec{T}_{AB}|}{91}$$

$$|\vec{T}_{AC}| \left(1 - \frac{8}{169} \right) = \frac{4|\vec{T}_{AB}|}{91} \Rightarrow |\vec{T}_{AC}| = \frac{52|\vec{T}_{AB}|}{1127}$$

$$|\vec{T}_{AD}| = \frac{6|\vec{T}_{AB}|}{7} + \frac{12|\vec{T}_{AB}|}{1127} = \frac{978|\vec{T}_{AB}|}{127}$$

3

a)



$$b) \sum M_B = 0 : 3 \cdot (N+260) \cdot \frac{5}{13} - 12 F_A \sin(60) - 3 F_A \cos(60) = 0$$

$$3 F_A \left(2\sqrt{2} - \frac{1}{2} \right) = \frac{15}{13} (N+260)$$

$$\vec{F}_A = \frac{5}{13} (N+260) \left(\frac{4\sqrt{2}-1}{2} \right) = \frac{5(N+260)(4\sqrt{2}-1)}{26}$$

$$\vec{F}_A = \frac{5(N+260)(4\sqrt{2}-1)}{26} \left(\frac{\sqrt{2}}{2} \hat{i} + \frac{1}{2} \hat{j} \right) = \boxed{277,36 \hat{i} + 196,12 \hat{j} \text{ lb}}$$

$$c) \sum F_x = 0: A_x - B_x - (N+260) \left(\frac{5}{13} \right) \Rightarrow B_x = A_x - (N+260) \left(\frac{5}{13} \right)$$

$$\sum F_y = 0: A_y + B_y - (N+260) \left(\frac{12}{13} \right) \Rightarrow B_y = (N+260) \left(\frac{12}{13} \right) - A_y$$

$$\vec{B} = -108,89\hat{i} + 208,187\hat{j}$$

④ a) $w_1 = 188 \frac{\text{lb}}{\text{ft}}$

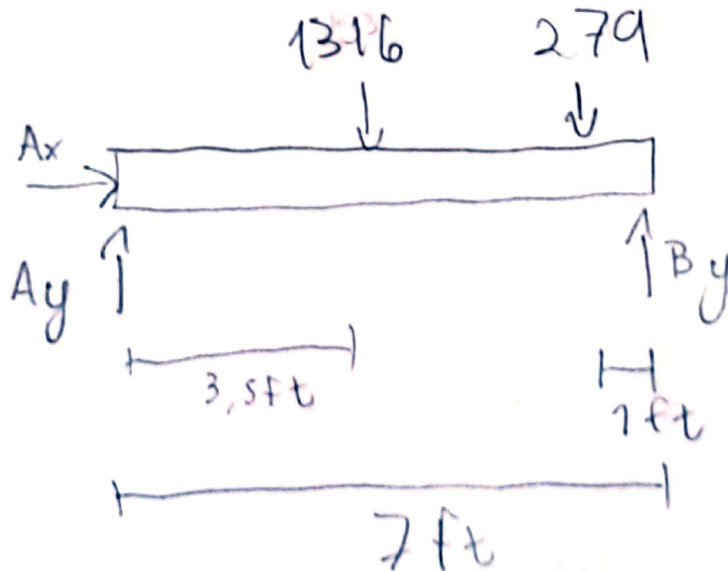
$w_2 = 374 \frac{\text{lb}}{\text{ft}}$

$F_1 = 7w_1 = 1316 \text{ lb}$

$F_2 = \frac{3(374 - 188)}{2} = 279 \text{ lb}$

$x_1 = 3,5 \text{ ft}$

$x_2 = 6 \text{ ft}$



b) $\sum M_A = 0 \Rightarrow 7B_y - 1316 \cdot 3,5 - 279 \cdot 6 = 0$

$B_y = 897,14 \text{ lb}$

$$c) \sum F_y = 0: A_y - 1316 - 374 + B_y = 0$$

$$A_y = 792,86 \text{ lb}$$

$$\sum F_x = 0: A_x = 0$$

$$\vec{A} = 792,86 \hat{j}$$