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$$L = 100 \text{ lb} + 80 \text{ lb} + P = 180 \text{ lb} + P$$

$$r_{\perp} = 10 \text{ in} \times \sin(\tan^{-1} 0.20) = 0.1961 \text{ in}$$

$$M = 80 \text{ lb} \times 10 \text{ in} - P \times 16 \text{ in} = L r_{\perp} = (180 \text{ lb} + P) \times 0.1961 \text{ in}$$

$$800 \text{ lb} \cdot \text{in} - 16P = 0.1961 (180 \text{ lb} + P)$$

$$16.196 P = (800 - 0.1961 \times 180) \text{ lb} \cdot \text{in} \rightarrow P = 47.2 \text{ lb}$$

Geometric, not arithmetic average

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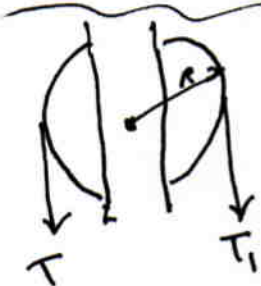
$$\phi = \tan^{-1} 0.25 = 14.04^\circ$$

$$T_1 + T_2 = 1962 \text{ N}$$

$$M = (T_1 - T_2) \cdot 45 \text{ mm} = 1962 \text{ N} \cdot 6 \text{ mm} \cdot \sin 14.04^\circ$$

$$T_1 - T_2 = 63.5 \text{ N}$$

$$T_1 = 1013 \text{ N}, 949 \text{ N}$$



$$L = T + T_1, \quad M = L r_{\perp} \sin \phi = (T_2 - T_1) R$$

10 mm 90 mm

$$\frac{T - T_1}{T + T_1} = \frac{T/T_1 - 1}{T/T_1 + 1} = \frac{10 \sin 14.04^\circ}{90} = \alpha$$

$$\frac{T}{T_1} = \frac{1 + \alpha}{1 - \alpha} \rightarrow T = 1069 \text{ N}$$

6/90

$$\beta = \frac{5}{2} \pi, \quad e^{\beta \mu} = 6$$

$$\rightarrow \mu = \frac{2}{5\pi} \ln 6 = 0.228$$

$$\begin{aligned} \textcircled{7/4} \quad y &= l(1 - \cos\theta), \quad \delta y = l \sin\theta \delta\theta \\ x &= l \sin\theta, \quad \delta x = l \cos\theta \delta\theta \\ F &= -ky \end{aligned}$$

$$\begin{aligned} \delta U &= P \delta x + F \delta y = [P l \cos\theta - k l^2 (1 - \cos\theta) \sin\theta] \delta\theta \\ P &= k l (\tan\theta - \sin\theta) \end{aligned}$$

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$$\begin{aligned} \delta\theta_1 &= 40 \delta\theta_2 \\ e &= \frac{M_2 \delta\theta_2}{M_1 \delta\theta_1} = \frac{1180 \delta\theta_2}{30 \times 40 \delta\theta_2} = 0.983 \end{aligned}$$