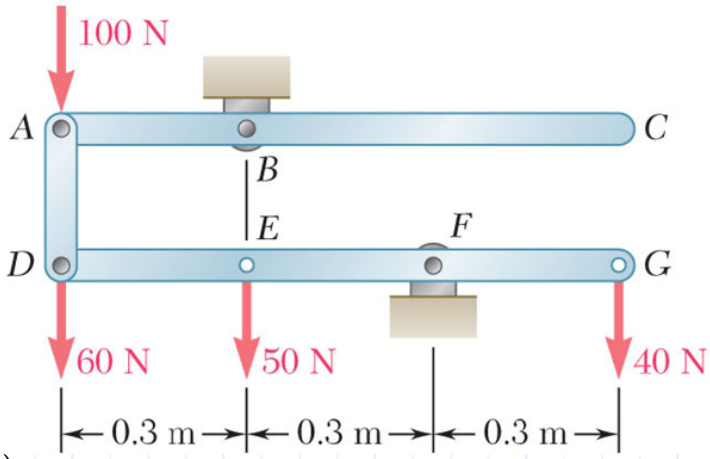
P10.1



$l := .3 \cdot m$ Distância entre os nós do mecanismo

$F_A := 100\ N$ Forças nos nós

$F_D := 60\ N$

$F_E := 50\ N$

$F_G := 40\ N$

$y_C = 2 \cdot l \cdot sin(\theta)$ $\quad y_A = -l \cdot sin(\theta)$ $\quad y_D = y_A$

$\delta y_C = 2 \cdot l \cdot cos(\theta) \cdot \delta\theta$ $\quad \delta y_A = -l \cdot cos(\theta) \cdot \delta\theta$ $\quad y_D = -l \cdot sin(\theta)$

$\delta y_D = -l \cdot cos(\theta) \cdot \delta\theta$

$y_E = \frac{y_D}{2}$ $\quad y_G = -y_E$

$y_E = -\frac{l}{2} \cdot sin(\theta)$ $\quad y_G = \frac{l}{2} \cdot sin(\theta)$

$\delta y_E = -\frac{l}{2} \cdot cos(\theta) \cdot \delta\theta$ $\quad \delta y_G = \frac{l}{2} \cdot cos(\theta) \cdot \delta\theta$

$\sum U = 0$

$substitute, \delta y_C = 2 \cdot l \cdot \cos(\theta) \cdot \delta\theta$

$substitute, \delta y_A = -l \cdot \cos(\theta) \cdot \delta\theta$

$substitute, \delta y_D = -l \cdot \cos(\theta) \cdot \delta\theta$

$substitute, \delta y_E = -\frac{l}{2} \cdot \cos(\theta) \cdot \delta\theta$

$substitute, \delta y_G = \frac{l}{2} \cdot \cos(\theta) \cdot \delta\theta$

$factor, l \cdot \delta\theta \cdot \cos(\theta)$

$F_C \cdot \delta y_C = -F_A \cdot \delta y_A - F_D \cdot \delta y_D - F_E \cdot \delta y_E - F_G \cdot \delta y_G \xrightarrow{explicit} 2 \cdot l \cdot \delta\theta \cdot F_C \cdot \cos(\theta) = l \cdot \delta\theta \cdot F_A \cdot \cos(\theta) + \frac{l \cdot \delta\theta \cdot F_E \cdot \cos(\theta)}{2} - \frac{l \cdot \delta\theta \cdot F_G \cdot \cos(\theta)}{2} +$

$\theta := 0\ deg$

$$F_C := 2 \cdot F_C = F_A + \frac{F_E}{2} - \frac{F_G}{2} + F_D \xrightarrow[explicit]{solve,\ F_C} \frac{F_A}{2} + \frac{F_D}{2} + \frac{F_E}{4} - \frac{F_G}{4} = 82.5\ N$$

10.3

$$substitute,\ \delta y_A = -l \cdot \cos(\theta) \cdot \delta\theta$$
$$substitute,\ \delta y_D = -l \cdot \cos(\theta) \cdot \delta\theta$$
$$substitute,\ \delta y_E = -\frac{l}{2} \cdot \cos(\theta) \cdot \delta\theta$$
$$substitute,\ \delta y_G = \frac{l}{2} \cdot \cos(\theta) \cdot \delta\theta$$

$$M_{ABC} \cdot \delta\theta = -F_A \cdot \delta y_A - F_D \cdot \delta y_D - F_E \cdot \delta y_E - F_G \cdot \delta y_G \xrightarrow{explicit} \delta\theta \cdot M_{ABC} = \frac{l \cdot \cos(\theta) \cdot \left(2 \cdot \delta\theta \cdot F_A + \delta\theta \cdot F_E - \delta\theta \cdot F_G + 2 \cdot \delta\theta \cdot F_D\right)}{2}$$

$\theta := 0$

$$M_{ABC} := \frac{l \cdot \cos(\theta) \cdot \left(2 \cdot F_A + F_E - F_G + 2 \cdot F_D\right)}{2} = 49.5\ N \cdot m$$