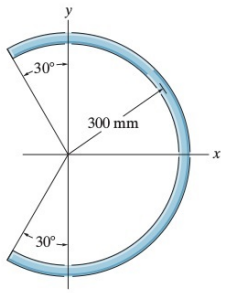
Problemas sobre centroides

salma [1]

[1]Instituto Tecnológico Superior Zacatecas Occidente

June 14, 2019

9–1. Locate the center of mass of the homogeneous rod bent into the shape of a circular arc.



Prob. 9–1

$$x = \frac{\int_{-\frac{2}{3}\pi}^{\frac{2}{3}\pi} x \; dm}{\int_{-\frac{2}{3}\pi}^{\frac{2}{3}\pi} dm}$$

Figure 1.

$$p = \frac{m}{l}$$

$$m = pL$$

$$dm = pdL$$

$$x = r\cos\theta$$

$$y = r\sin\theta$$

$$dL = rd\theta$$

$$x = \frac{r^2 \int_{-\frac{2}{3}\pi}^{\frac{2}{3}\pi} \cos\theta d\theta}{r\int_{-\frac{2}{3}\pi}^{\frac{2}{3}\pi} d\theta} = \frac{r\sin\theta \int_{-\frac{2}{3}\pi}^{\frac{2}{3}\pi}}{\theta \int_{-\frac{2}{3}\pi}^{\frac{2}{3}\pi}} = \frac{r[0.86+0.86]}{\frac{4}{3}\pi} = 300mm\left(\frac{1.732}{4.188}\right) = 124.06m$$

$$x = r\cos\ \theta$$

$$y = rsen\theta$$

$$dl = rd\theta$$

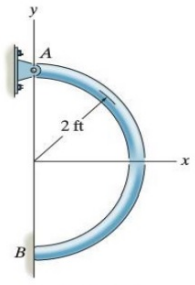
$$w = \left(\frac{0.5lb}{ft}\right)\pi ft$$

$$x = r^2 \frac{\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \cos\theta d\theta}{\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} d\theta} = \frac{2r}{\pi}$$

$\Sigma f = 0 \qquad \Sigma m = 0$

$-\left(\frac{2r}{\pi}\right)(\pi Ib) + 48x = 0$

9–2. Locate the center of gravity $\bar{x}$ of the homogeneous rod bent in the form of a semicircular arc. The rod has a weight per unit length of 0.5 lb/ft. Also, determine the horizontal reaction at the smooth support B and the x and y components of reaction at the pin A.



Prob. 9–2

$$4ft = \left(\frac{2r}{\pi}\right)(\pi Ib)$$
$$Bx = 1Ib$$
$$Bx = Ax = 1Ib$$

Figure 1: This is a caption