Problemas sobre centroides:

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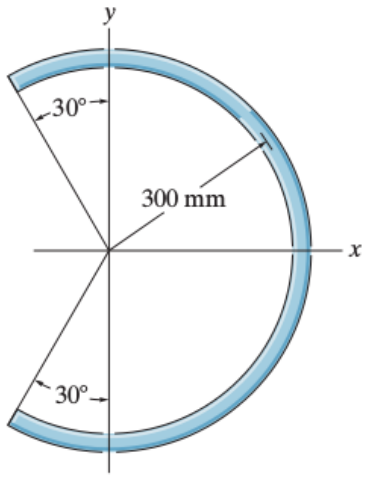
Problema # 1.-

Localice el centro de masa de la barra homogénea doblada en la forma de un arco circular.



solución:

$x = \frac{\int x dl}{\int dl}$

$y = \frac{\int y dl}{\int d}$

$[-120, 120]$ $\left[-\frac{2\pi}{3}, \frac{2\pi}{3}\right]$

$x = \cos\theta$

$y = sen\theta$

$dl = Rd\theta$

$$x = \frac{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} R^2 \cos\theta d\theta}{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} R d\theta} = \frac{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} \cos\theta d\theta}{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} d\theta}$$

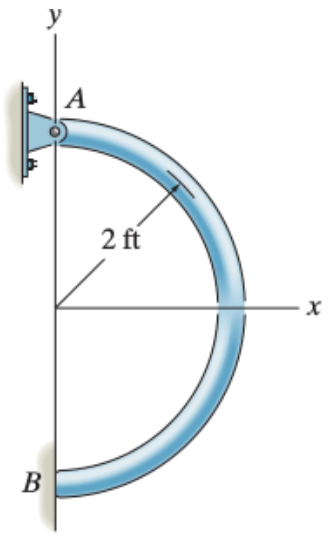
$$y = \frac{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} R^2 \sin\theta d\theta}{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} R d\theta} = \frac{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} \sin\theta d\theta}{\int_{\frac{2\pi}{3}}^{\frac{2\pi}{3}} d\theta}$$

$$x = \frac{R[\sin\theta]_{\frac{2\pi}{3}}^{\frac{2\pi}{3}}}{[\theta]_{\frac{2\pi}{3}}^{\frac{2\pi}{3}}} = \frac{R\sqrt{3}}{\left[\frac{2\pi}{3}\right]+\left[\frac{2\pi}{3}\right]} = \frac{3\sqrt{3}R}{4\pi}$$

$$y = \frac{R[-\cos\theta]_{\frac{2\pi}{3}}^{\frac{2\pi}{3}}}{[\theta]_{\frac{2\pi}{3}}^{\frac{2\pi}{3}}} = \frac{R[0.5+(-0.5)]}{\frac{4\pi}{3}} = 0$$

Problema # 2.-

Localice el centro de gravedad de x barra, de la barra homogénea doblada en la forma de un arco semicircular. la barra tiene un peso por unidad de longitud de 0.5 lb/ft. Ademas, determine la reacción horizontal en el super corte liso B y el componente x e y de la dirección de A.



solución:

$x = \frac{\int x dl}{\int dl} = \int_{\frac{\pi}{2}}^{\frac{\pi}{2}} R\cos R\theta$

$x = R\cos\theta$

$dl = Rd\theta$

$$\frac{Rsen\theta\left|_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\right.}{\theta\left|_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\right.} = \frac{R[1+1]}{\pi} = \frac{2(2)}{\pi} = \frac{4}{2} = 1.25$$

1)Σfx $\quad B_x = 1lb$

2)Σfy $\quad A_x = 1lb$

3)Σma $\quad A_y = \pi lb$

1.-$A_x + B_x$

2.-$A_y - w = 0 \quad A_y = w$

3.- $-xw + B_x\,(4ft) = 0$

$-2\frac{r}{\pi}\left(0.5\frac{lb}{ft}\right)\pi + B_x\,(4ft) = 0$

$-2r^2\left(0.5\frac{lb}{ft}\right) + 4ftB_x = 0$

$4ftB_x = 2\ \ r^2\ \ \left(0.5\frac{lb}{ft}\right)$

$B_x = \frac{2r^2}{4ft}\left(0.5\frac{lb}{ft}\right) = \left[\frac{2(4ft)}{(4ft)}\right](0.5lb) = 1lb$