Problemas de Centroides

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***Abstract*—En los siguientes problemas se presentan algunos casos típicos de centroides.**

1) Calcular el centro de masa de una barra homogénea en forma de arco circular.

$\vec{x} = x = r\ \cos\ \theta$ dl=$\sqrt{dx^2 + dy^2}$

$dl = rd\theta$ $=\sqrt{r^2\ sen^2\ \theta d\theta^2 + r^2 \cos^2 \theta d\theta^2}$

dx=r $2r^2\left(\frac{0.5lb}{ft}\right)$ $Bx = \ 1\ lb$

sen$\theta\ d\theta$ Ax=Bx

dy=r $2\,Ay - w = 0$

cos $\theta\ d\theta$ $\frac{2r^2}{4ft}\left(\frac{0.5lb}{ft}\right)$ $Ax = \ 1lb$

$\vec{x}$=$\frac{\int_L \vec{x} dl}{\int_L dl}$ Ay=w

$=\sqrt{r^2\ d\theta^2\ (sen^2\theta + \cos^2\theta)}$ $-\quad \vec{x}w \quad + \quad Bx\,(4ft) \quad =$

$=$ 0 $=$

r dθ “1” $=\frac{2(4ft^2)}{4ft^2}\,(0.5lb)$ $Ay = \pi\ lb$

$=\frac{\int_{\frac{-2\pi}{3}}^{\frac{2\pi}{3}} r\ \cos\ \theta\ r\ d\theta}{\int_{\frac{-2\pi}{3}}^{\frac{2\pi}{3}} r\ d\theta}=\frac{r\ sen\theta\left|_{\frac{-2\pi}{3}}^{\frac{2\pi}{3}}\right.}{\theta\left|_{\frac{-2\pi}{3}}^{\frac{2\pi}{3}}\right.}=\frac{r(0.866+0.866)}{\frac{4\pi}{3}}=\frac{300[1.732]}{4.189}=$ $\frac{-2r}{\pi}\left(\frac{0.5lb}{ft}\right)r\pi \ + \ Bx\,(4ft) \ =$

$124\ mm$ 0 $= 1\ lb$

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

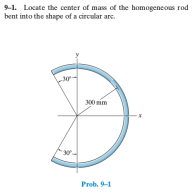
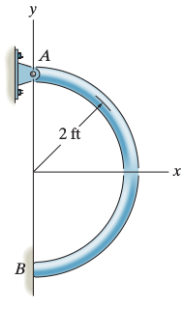


Figure 1. This is a caption

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

Figure 2. This is a caption

2) Calcular el centro de gravedad de $\vec{x}$ de una barra homogénea en forma de un arco semicircular.

x=r

cosθ $\frac{w}{\pi} = 0.5\ \frac{lb}{ft}$

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

dθ $1\Sigma fx = 0$