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1 Calcular longitud de la curva $\vec{r}(t)=(t, 3\cos t, 3\sin t)$

empezando en $A(\frac{\pi}{2}, 0, 3)$ hasta $B(\pi, -3, 0)$

veamos que $t$ va de $\frac{\pi}{2}$ a $\pi$ entonces $t \in [\frac{\pi}{2}, \pi]$

ahora calculemos la longitud $L = \int_a^b \|\vec{r}'(t)\| \, dt$

veamos que es $\vec{r}'(t)$

$$\vec{r}'(t) = (1, -3\sin(t), 3\cos(t))$$

$x(t) = t \qquad x'(t) = 1$

$y(t) = 3\cos(t) \qquad y'(t) = -3\sin(t)$

$z(t) = 3\sin(t) \qquad z'(t) = 3\cos(t)$

$$\|\vec{r}'(t)\| = \sqrt{1^2 + 9\sin^2(t) + 9\cos^2(t)}$$

$$= \sqrt{1^2 + 9(\sin^2(t) + \cos^2(t))}$$

$$= \sqrt{1^2 + 9(1)} \qquad \text{por identidad trigo}$$

$$= \sqrt{1+9} = \sqrt{10}$$

entonces ahora longitud es $L = \int_{\frac{\pi}{2}}^{\pi} \sqrt{10} \, dt$

$$\int_{\frac{\pi}{2}}^{\pi} \sqrt{10}\, dt = \sqrt{10} \int_{\frac{\pi}{2}}^{\pi} dt = \sqrt{10} \quad t \Big|_{\frac{\pi}{2}}^{\pi}$$

$$= \sqrt{10} \left[ \pi - \frac{\pi}{2} \right] = \sqrt{10} \left[ \frac{\pi}{2} \right]$$

$$= \frac{\pi}{2} \sqrt{10} \simeq 4.967$$

GeoGebra Calculadora 3D

ABRIR SESIÓN

Álgebra

Herramientas

a = Curva(t, 3 cos(t), 3 sen(t),

$\rightarrow \left.\begin{array}{l} x = t \\ y = 3\ \cos(t) \\ z = 3\ \sin(t) \end{array}\right\} -20 \le t \le$

$A = \left(\frac{\pi}{2}, 0, 3\right)$

$\rightarrow (1.57, 0, 3)$

$B = (\pi, -3, 0)$

$\rightarrow (3.14, -3, 0)$

+ Entrada...

GeoGebra Calculadora 3D