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#121260

Activity 1.1

MATH 1360-80
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1. Encuentre el área de la región $y = e^{-x} \sin \pi x$, $y = 0$, $x = 0$ y $x = 1$
2. Halle el volumen del sólido de revolución generado al girar la región dada, alrededor del eje indicado

$$y = \sin x, \quad y = 0, \quad \pi/2 \leq x \leq \pi, \quad \text{alrededor del eje } x$$

$$\begin{array}{lll} 1) & y = e^{-x} \sin \pi x & x = 0 & b = 1 \\ & y = 0 & x = 1 & a = 0 \end{array}$$

$$\text{Formula } \int_a^b u \cdot dv = u \cdot v - \int v \cdot du \Big|_a^b$$

$$\begin{array}{ll} u = \sin(\pi x) & dv = e^{-x} dx \\ du = -\pi \sin(\pi x) & v = -e^{-x} \end{array}$$

$$\int_0^1 e^{-x} dx \cdot e^{-x} dx = \sin(\pi x) \cdot -e^{-x} - \int -e^{-x} \cdot -\pi \sin(\pi x) dx \Big|_0^1$$

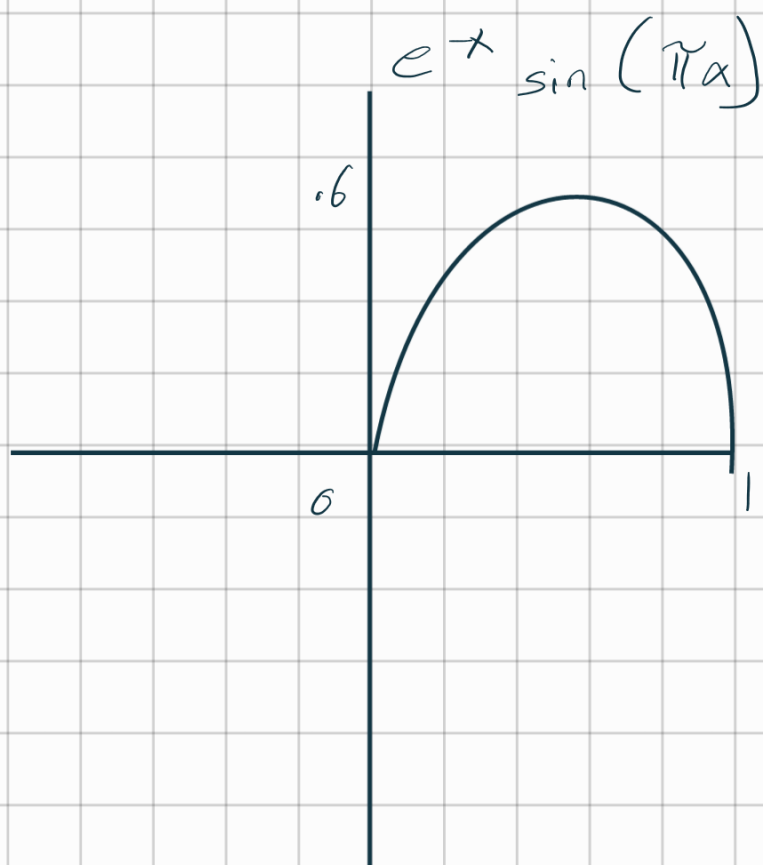
$$(\pi^2 + 1) \int_0^1 e^{-x} \sin(\pi x) dx = e^{-x} \sin(\pi x) - \pi e^{-x} \cos(\pi x) \Big|_0^1$$

$$= \frac{e^{-x} \sin(\pi x) - \pi e^{-x} \cos(\pi x)}{\pi^2 + 1} \Big|_0^1$$

$$= \frac{e^{-1} \sin(\pi) - \pi e^{-1} \cos(\pi) - e^0 \sin(0) + \pi e^0 \cos(0)}{\pi^2 + 1}$$

$$= \frac{0 - \pi e^{-1}(-1) - 0 + \pi}{\pi^2 + 1} = \frac{\pi e^{-1} + \pi}{\pi^2 + 1}$$

$$A = .395 \dots$$



2) $y = \sin x, y = 0, \frac{\pi}{2} \leq x \leq \pi$ alrededor de eje de x

$$\text{Volumen} = \pi \int_{\frac{\pi}{2}}^{\pi} \sin^2 x \, dx \quad \int \sin^2 x = \frac{\cos 2x}{2}$$

$$= \pi \int_{\frac{\pi}{2}}^{\pi} (1 - \cos 2x)^2 \, dx$$

$$= \frac{\pi}{2} \int_{\frac{\pi}{2}}^{\pi} \frac{1 - \cos 2x}{2} \, dx$$

$$= \frac{\pi}{2} \left(x - \frac{\sin 2x}{2} \right) \Big|_{\frac{\pi}{2}}^{\pi}$$

$$= \frac{\pi}{2} \left[\left(\pi - \frac{\sin 2\pi}{2} \right) - \left(\frac{\pi}{2} - \frac{\sin \pi}{2} \right) \right]$$

$$= \frac{\pi}{2} \left(\pi - \frac{\pi}{2} \right)$$

$$= \frac{\pi^2}{4} \approx 2.467401$$

