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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
   $y = senx,\quad y = 0,\quad \pi/2 \le x \le \pi,\qquad alrededor\ del\ eje\ x$

1) $y = e^{-x} \sin \pi x \qquad x = 0 \qquad b = 1$
$y = 0 \qquad\qquad yx = 1 \qquad a = 0$

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

$u = \sin(\pi x) \qquad dv = e^{-x} dx$
$du = -\pi \sin(\pi x) \qquad v = -e^{-x}$

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

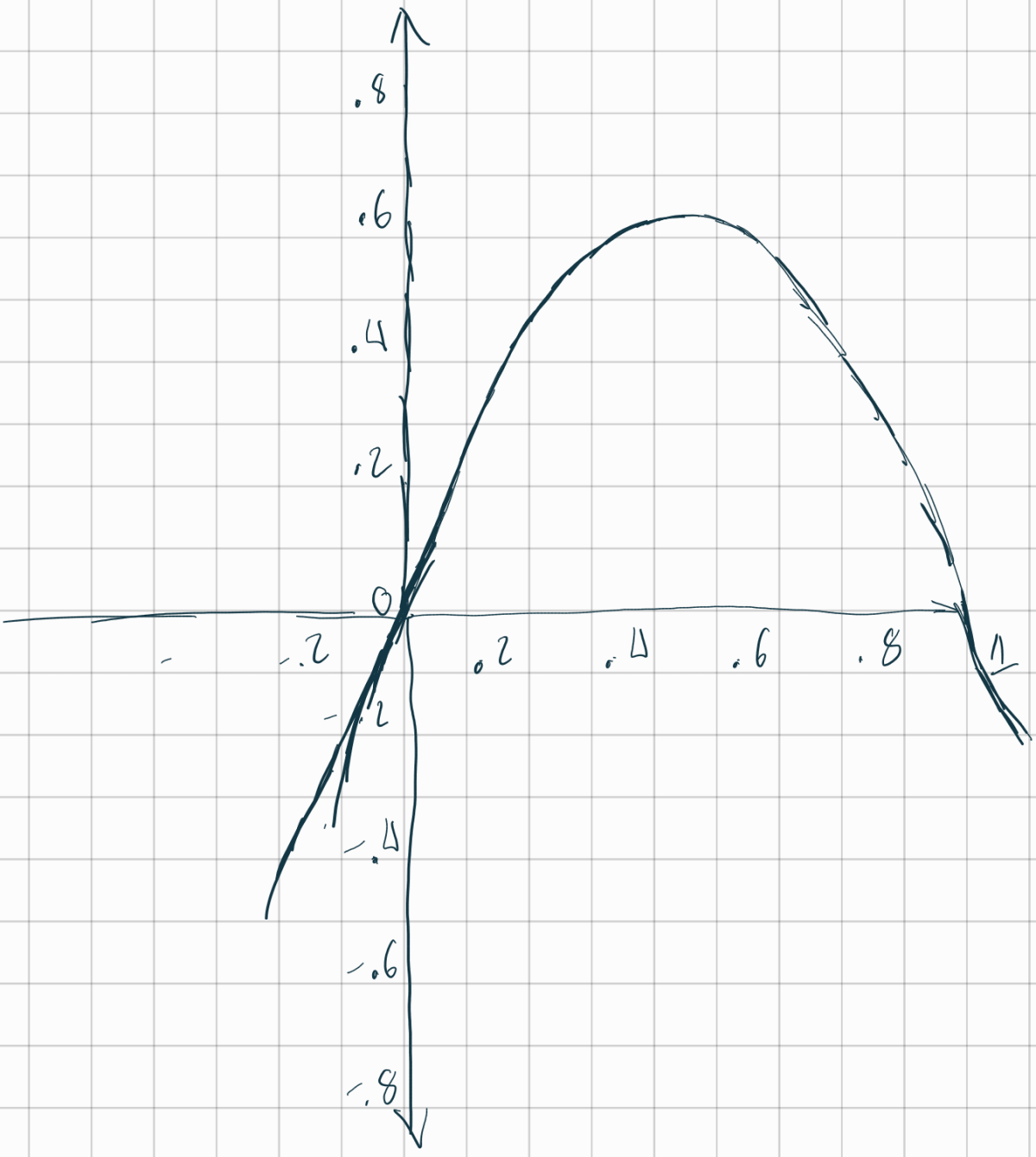
$$(\pi^2+1) \int_0^1 e^{-x} \sin(\pi x)\, dx = e^{-x} \sin(\pi x) - \pi e^{-x} \cos(\pi x) \Big|_0$$

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

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

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

$A = .395\ldots$


.8
.6
.4
.2
0
-.2
.2
.4
.6
.8
1
-.2
-.4
-.6
-.8

2) $y = \operatorname{sen} x,\ y = 0,\ \pi/2 \le x \le \pi$ alrededor de eje de X

$$\text{Volumen} = \pi \int_{\pi/2}^{\pi} \operatorname{sen} x^2\, dx \qquad \int \operatorname{sen} x = \frac{\cos 2x}{2}$$

$$= \pi \int_{\pi/2}^{\pi} (1 - \cos 2x)^2$$

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

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

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

$$= \pi/2 \left(\pi - \pi/2\right)$$

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