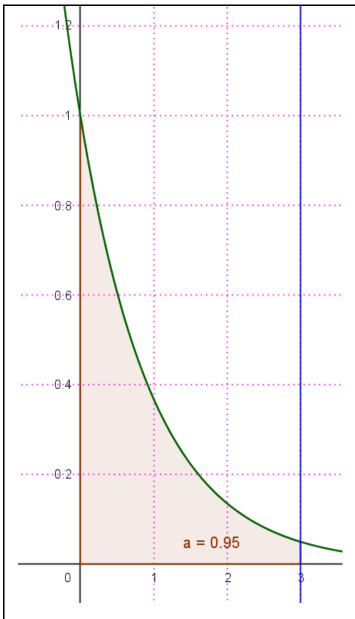
Pág. 381,

47)

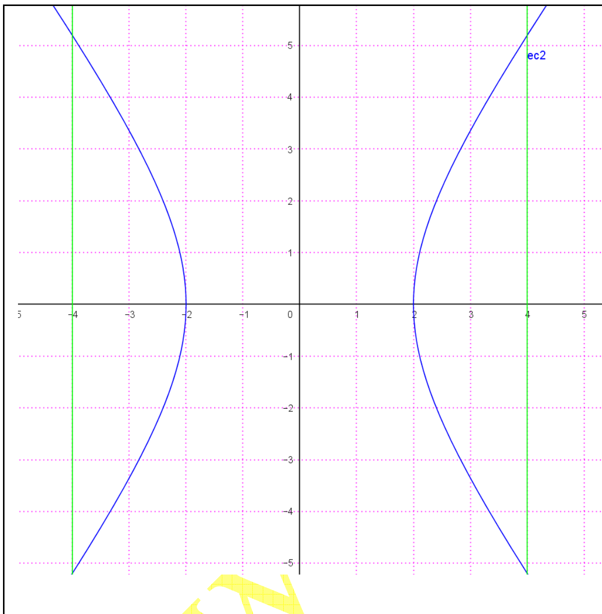


$$V=\int_0^3 \pi\left(e^{-x}\right)^2 dx=\pi\int_0^3 e^{-2x}dx=(*)$$

$$\int e^{-2x}dx=\begin{cases} t=-2x \\ dt=-2dx \quad dx=\dfrac{dt}{-2}\end{cases}=\int e^t\,\frac{dt}{-2}=\frac{1}{-2}\int e^t dt=\frac{-e^t}{2}=\frac{-e^{-2x}}{2}$$

$$(*)=\pi\left[\frac{-e^{-2x}}{2}\right]_0^3=\pi\left[\left(\frac{-e^{-2\cdot 3}}{2}\right)-\left(\frac{-e^{-2\cdot 0}}{2}\right)\right]=\pi\left(\frac{-1}{2\cdot e^6}+\frac{1}{2}\right)=1'5669\ u^3$$

49)



$$\frac{x^2}{4}-\frac{y^2}{9}=1$$

$$\frac{x^2}{4}-1=\frac{y^2}{9}\quad\rightarrow\quad y^2=9\left(\frac{x^2}{4}-1\right)$$

$$V_1=\pi\int_2^4 9\left(\frac{x^2}{4}-1\right)dx=9\pi\int_2^4\left(\frac{x^2}{4}-1\right)dx=$$

$$=9\pi\left[\frac{x^3}{12}-x\right]_2^4=9\pi\left[\left(\frac{4^3}{12}-4\right)-\left(\frac{2^3}{12}-2\right)\right]=9\pi\frac{8}{3}=\frac{72\pi}{3}$$

El volumen engendrado por la hipérbola será:

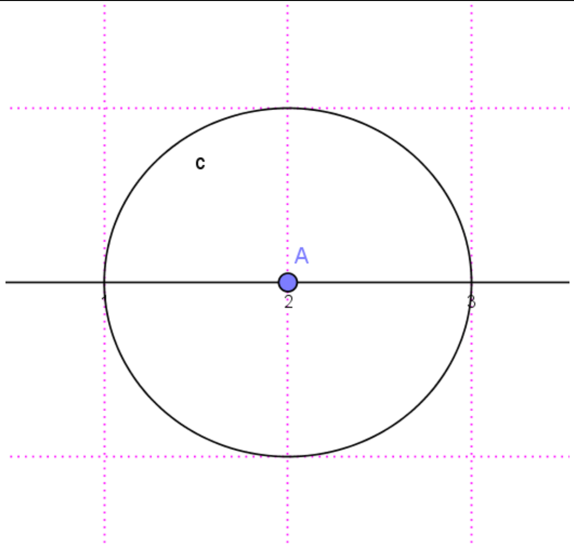
$$V=2\frac{72\pi}{3}=\frac{144\pi}{3}u^3=48\pi\ u^3\cong 150'7964\ u^3$$

50)

$$Circunferencia: \quad x^2+y^2-4x+3=0 \qquad (x-a)^2+(y-b)^2=r^2$$

$$x^2-4x+4-4+y^2=-3$$

$$(x-2)^2+y^2=1 \quad circunferencia\left\langle \begin{array}{l} centro(2,0) \\ r=1 \end{array} \right.$$



La circunferencia al girar alrededor del eje X genera una esfera de radio1, por lo tanto su volumen será: $\frac{4}{3}\pi\cdot 1^3=\frac{4}{3}\pi\, u^3$

Otra forma:

$$x^2+y^2-4x+3=0 \quad y^2=-x^2+4x-3$$

$$V=\pi\int_1^3\left(-x^2+4x-3\right)dx=\pi\left[-\frac{x^3}{3}+4\frac{x^2}{2}-3x\right]_1^3=$$

$$=\pi\left[\left(-\frac{3^3}{3}+2\cdot 3^2-3\cdot 3\right)-\left(-\frac{1^3}{3}+2\cdot 1^2-3\cdot 1\right)\right]=\pi\frac{4}{3}=$$

$$=\frac{4\pi}{3}u^3$$

Pág. 383, autoevaluación 1, 2 y 3