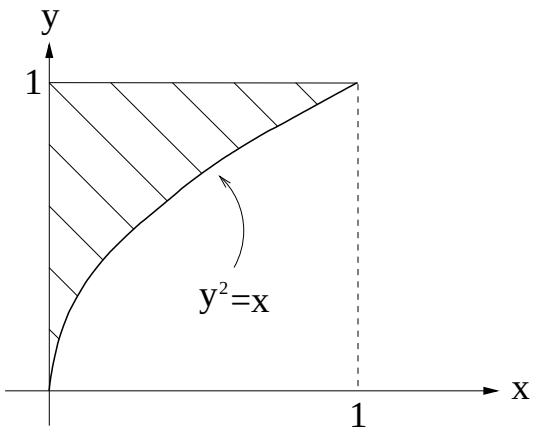
Question

Sketch the region enclosed by the given curves and find the volume of the solid generated when it is revolved about the x-axis:

$y^2 = x$, $y = 1$, $x = 0$.

Answer



Either use washer method:

$$\int_{x=0}^{x=1} \left\{\pi(1)^2 - \pi(\sqrt{x})^2\right\}\, dx = \pi \int_{x=0}^{x=1} (1-x)\, dx = \pi \left[x - \frac{x^2}{2}\right]_0^1 = \frac{\pi}{2}$$

or use shell method:

$$\int_{y=0}^{y=1} (2\pi y)(y^2)\, dy = 2\pi \int_{y=0}^{y=1} y^3\, dy = 2\pi \left[\frac{y^4}{4}\right]_0^1 = \frac{\pi}{2}$$