

1. Find the volume of the solid generated by revolving the region bounded by the following lines and curves about $y = 1$. (Use the shell method for practice.)

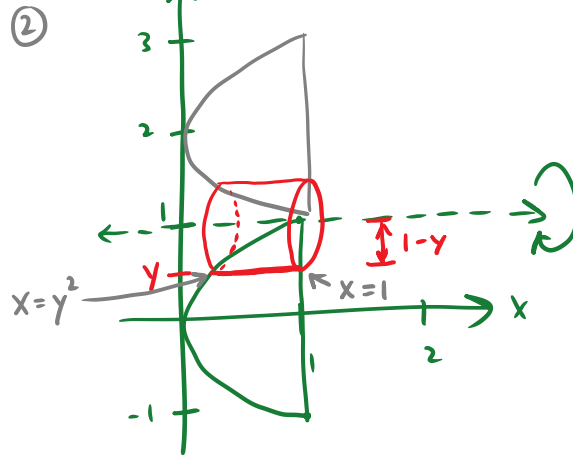
$$x = y^2, x = 1$$

① Intersection pts:

$$y^2 = 1$$

$$y = \pm 1$$

$$(1, 1) (1, -1)$$



④
$$V = \int_{-1}^1 2\pi(1-y)(1-y^2) dy$$

$$= 2\pi \int_{-1}^1 (1-y-y^2+y^3) dy$$

$$= 2\pi \left[y - \frac{1}{2}y^2 - \frac{1}{3}y^3 + \frac{1}{4}y^4 \right]_{-1}^1$$

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

$$= 2\pi \left(1 - \cancel{\frac{1}{2}} - \frac{1}{3} + \cancel{\frac{1}{4}} + 1 + \cancel{\frac{1}{2}} - \frac{1}{3} - \cancel{\frac{1}{4}} \right)$$

$$= 2\pi \left(2 - \frac{2}{3} \right)$$

$$= 2\pi \left(\frac{4}{3} \right)$$

$$= \boxed{\frac{8\pi}{3}}$$

③ radius = $1 - y$ ← top-bot
height = $1 - y^2$ ← right-left

Q: What goes around the world but stays in a corner?