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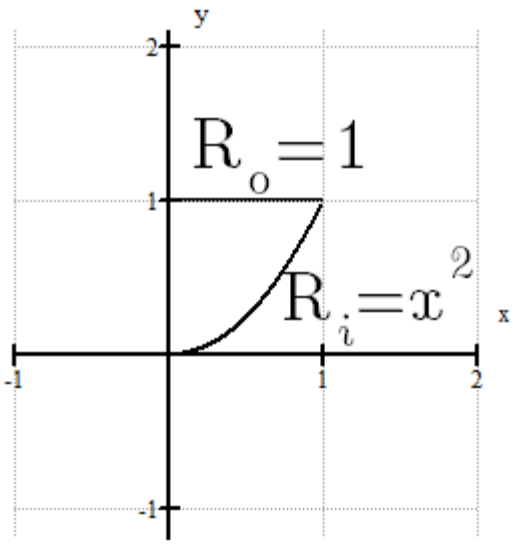
Given $y = x^2$ and $y=1$, find the volume from rotating the region about the x axis. Assume $x \geq 0$

a. Use the washer method.

b. The upper limit is 1 from $x^2 = 1$.



1) $\text{Volume} = \int_0^1 \pi\left(R_o^2 - R_i^2\right)\,dx$ $\qquad R_o = 1 \qquad R_i = x^2$

2) $\text{Volume} = \int_0^1 \pi\left[1^2 - \left(x^2\right)^2\right]\,dx$ $\qquad$ Replace

3) $\text{Volume} = \pi \cdot \int_0^1 \left(1 - x^4\right)\,dx$ $\qquad$ Simplify the exponents. Pull π out.

4) $\text{Volume} = \pi \cdot \left(x - \frac{1}{5}x^5\right)\Big|_0^1$ $\qquad$ Integrate with power rule.

5) $\text{Volume} = \pi\left[1 - \frac{1}{5}(1)^5 - \left[0 - \frac{1}{5}(0)^5\right]\right] = \pi\left(1 - \frac{1}{5}\right) = \pi\left(\frac{5}{5} - \frac{1}{5}\right) = \frac{4\pi}{5}$