

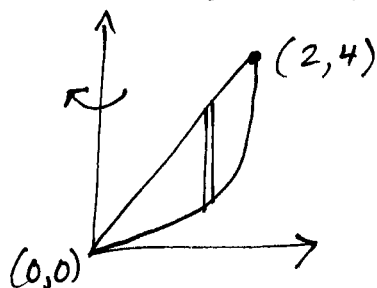
WRITE YOUR NAME:

MAC 2312 Quiz 2
Wednesday February 22nd

Question 1. Find the volume of the solid that results when the region enclosed by $y = 2x$ and $y = x^2$ is revolved around the y -axis.

Intersection points? $2x = x^2$
 $0 = x^2 - 2x$
 $0 = x(x-2) \Rightarrow x=0, x=2$

Rough picture:



$y = 2x$ is top curve
 $y = x^2$ is bottom curve



Cylindrical shells. Volume = $\int_0^2 2\pi r h dx$

$$r = \text{slice-axis} = x - 0 = x$$

$$h = \text{top-bottom} = 2x - x^2$$

$$\text{Volume} = 2\pi \int_0^2 x(2x - x^2) dx = 2\pi \int_0^2 (2x^2 - x^3) dx$$

$$= 2\pi \left[\frac{2x^3}{3} - \frac{x^4}{4} \right]_0^2 = 2\pi \left(2 \cdot \frac{2^3}{3} - \frac{2^4}{4} \right)$$

$$= 2\pi \left(\frac{16}{3} - \frac{16}{4} \right) = 2\pi \left(\frac{16}{3} - 4 \right) = 2\pi \left(\frac{16}{3} - \frac{12}{3} \right)$$

$$= 2\pi \cdot \frac{4}{3} = \boxed{\frac{8\pi}{3}}$$