

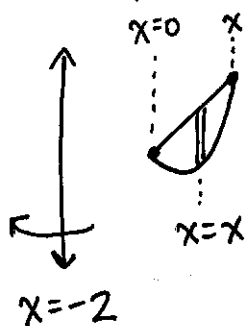
WRITE YOUR NAME:

MAC 2312 Quiz 7
Tuesday February 6th

Let A be the region bounded by $y = 2x$ and $y = x^2$. Find the volume obtained by revolving A around the line $x = -2$.

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

Test input $x=1$: $y=2x=2 \cdot 1 = 2 \leftarrow$ bigger output, top curve
 $y=x^2=1^2=1 \leftarrow$ smaller output, bottom curve



Vertical slice around vertical axis \rightarrow SHELLS
 $h =$ distance between "big curve" and "small curve"
 $=$ top - bottom $= 2x - x^2$

$r =$ distance between "typical slice" and axis of revolution
 $= x - (-2) = x + 2$

$$\text{Volume} = \int_{x=0}^{x=2} 2\pi r h dx = 2\pi \int_0^2 \underbrace{(x+2)}_r \underbrace{(2x-x^2)}_h dx$$

$$= 2\pi \int_0^2 (2x^2 - x^3 + 4x - 2x^2) dx$$

$$= 2\pi \int_0^2 (4x - x^3) dx = 2\pi \left[2x^2 - \frac{x^4}{4} \right]_0^2$$

$$= 2\pi \left(2 \cdot 2^2 - \frac{2^4}{4} \right) = 2\pi \left(\underbrace{8 - 4}_4 \right) = 8\pi$$