

Quiz 06

NAME

- (1) The graph of $y = x^2$ between $x = 0$ and $x = 2$ is rotated around
(a) the x -axis;
(b) the y -axis.

Compute the volumes of the resulting solids.

- a) Using cross sections, the volume is

$$V = \pi \int_0^2 x^4 dx = \frac{32}{5}\pi.$$

Using shells, we integrate in the y -direction. The radius is just y , the height is $2 - x = 2 - \sqrt{y}$, hence

$$V = 2\pi \int_0^4 y(2 - \sqrt{y}) dy = \frac{32}{5}\pi.$$

- b) Using shells, the radius is x , the height is $y = x^2$, so the volume is

$$V = 2\pi \int_0^2 x^3 dx = 8\pi.$$

Using cross sections, you can subtract the volume of the paraboloid from the volume of the big cylinder, which is 16π . The volume of the paraboloid is $\pi \int_0^4 y dy = 8\pi$, hence $V = 16\pi - 8\pi = 8\pi$.