Name Solutions

UID

Math 1210-2

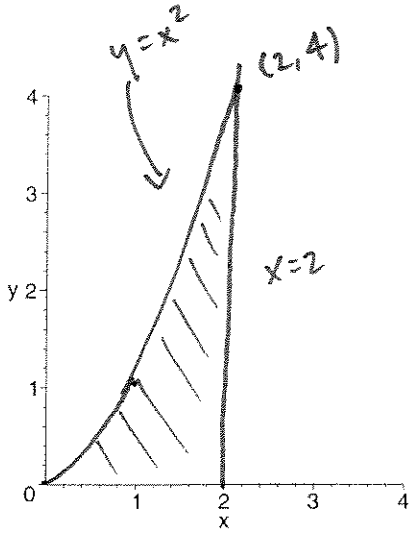
Quiz 9

November 30, 2007

Show all work for complete credit!

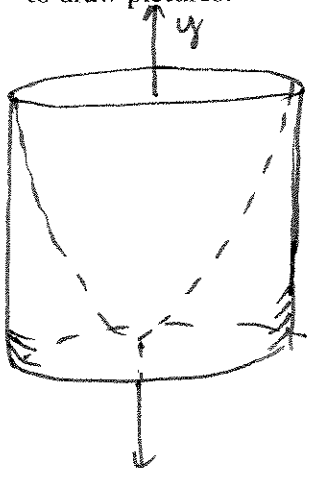
1a) Sketch the region in the first quadrant bounded between the x-axis, the vertical line x=2, and the graph $y = x^2$.

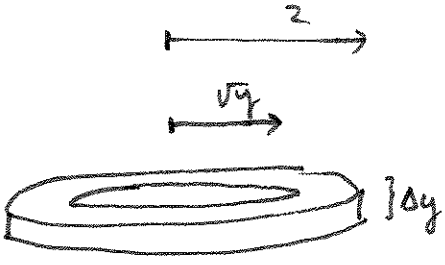
(2 points)

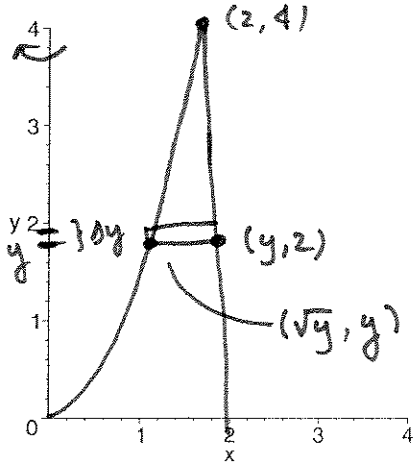


1b) Consider the object created by rotating the region in (1a) about the y-axis. Compute its volume using planar slabs (which are washers in this case). The coordinate axes are provided in case you want to draw pictures.

(4 points)







since $y = x^2$

$x = \pm\sqrt{y}$

$\Delta V \approx \pi (2^2 - \sqrt{y}^2)\,\Delta y$

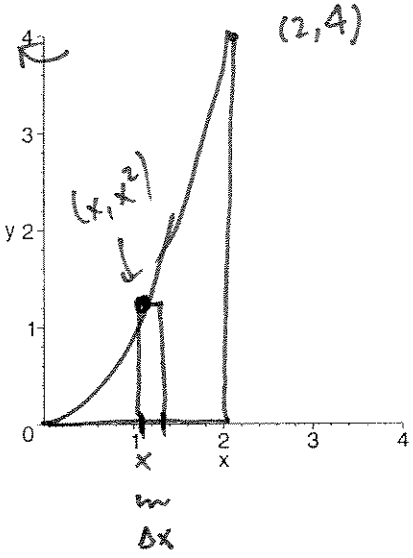
$= \pi (4 - y)\,\Delta y$

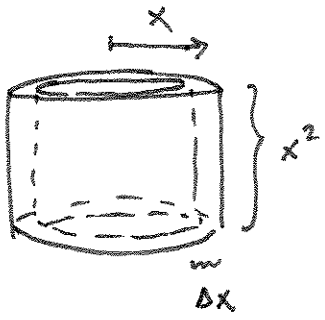
$$V = \int_0^4 \pi (4-y)\,dy = \pi \left(4y - \frac{y^2}{2}\right)\Big]_0^4$$

$$= \pi (16 - 8)$$

$$= 8\pi$$

1c) Recompute the the volume in part (1b), but using cylindrical shells rather than planar slabs.
(4 points)





$$\Delta V \approx (2\pi x)(\Delta x)\, x^2$$

$$V = \int_0^2 2\pi x^3 \, dx$$

$$= 2\pi \left[\frac{x^4}{4} \right]_0^2$$

$$= 2\pi \frac{16}{4}$$

$$= 8\pi$$