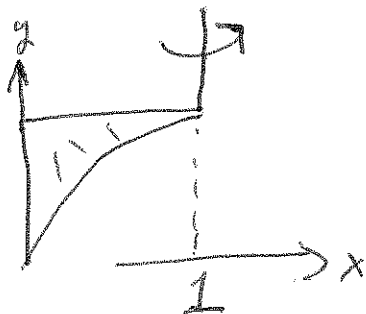


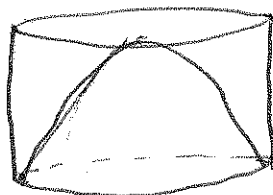
Find the volume of the solid obtained by revolving the region bounded by the y -axis, $y = \sqrt{x}$, and $y = 1$ about the line $x = 1$.

The region is



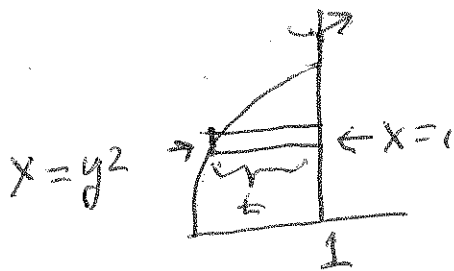
Quiz 17 Thursday
Oct 15, 2015
Math 142

The resulting solid is



This solid is a bowl

upside down. To find the volume we take a big disk of height 1 and radius 1 (so volume $\pi(1^2)1$) and carve out the inside. The answer is π - The volume of the material carved out. We draw the rectangle with y -coordinate y which we carve out



We chopped the y -axis from $y = 0$ to $y = 1$.

Revolve a rectangle get a disk of volume

$$\pi r^2 t = \pi (1 - y^2)^2 dy \quad \text{because } t = dy \text{ and } r = 1 - y^2$$

$$\text{The answer is } \pi - \int_0^1 (1 - y^2)^2 dy = \pi - \pi \int_0^1 (1 - 2y^2 + y^4) dy$$

$$= \pi - \pi \left[\left(y - \frac{2y^3}{3} + \frac{y^5}{5} \right) \Big|_0^1 \right] = \pi - \pi \left(1 - \frac{2}{3} + \frac{1}{5} \right) = \pi \left(\frac{2}{3} - \frac{1}{5} \right)$$

$$= \pi \frac{10-3}{15} = \left(\pi \frac{7}{15} \right)$$