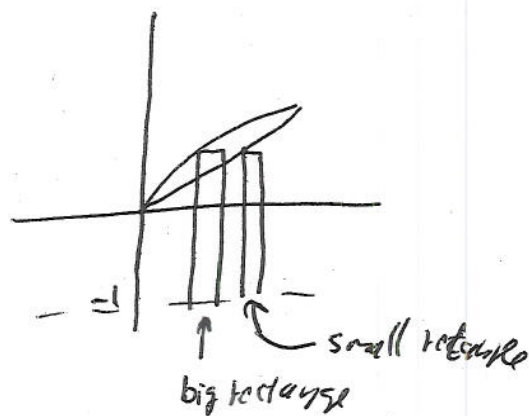
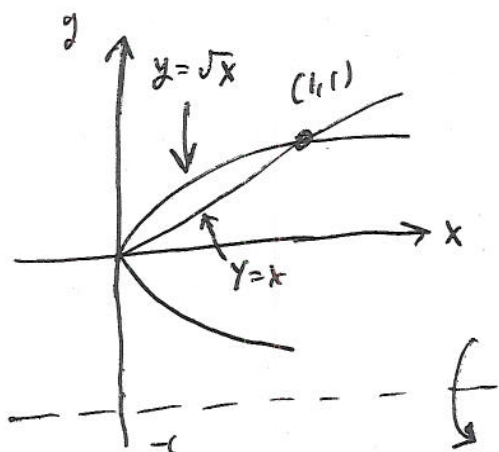


PRINT Your Name: _____

Quiz - September 6, 2006

Find the volume of the solid that is obtained when the region bounded by $x = y^2$ and $x = y$ is revolved about the line $y = -1$.



I use washers.

Spin a big rectangle. Get a big disk of vol $\pi r^2 t$ where

$$t = dx \text{ and } r = \sqrt{x} + 1 \quad \text{Vol} = \pi (\sqrt{x} + 1)^2 dx$$

Spin a small rectangle. Get a small disk of vol $\pi r^2 t$ where

$$t = dx \text{ and } r = x + 1 \quad \text{Vol} = \pi (x + 1)^2 dx$$

Each big rectangle minus a little rectangle is a washer.

Add up the volume is the washers. Take the limit.

$$\begin{aligned} \pi \int_0^1 (x + 2\sqrt{x} + 1 - (x^2 + 2x + 1)) dx &= \pi \int_0^1 x^2 + 2\sqrt{x} - x dx = \pi \left(-\frac{x^3}{3} + \frac{4}{3}x^{3/2} - \frac{x^2}{2} \right) \Big|_0^1 \\ &= \pi \left(-\frac{1}{3} + \frac{4}{3} - \frac{1}{2} \right) = \boxed{\frac{\pi}{2}} \end{aligned}$$