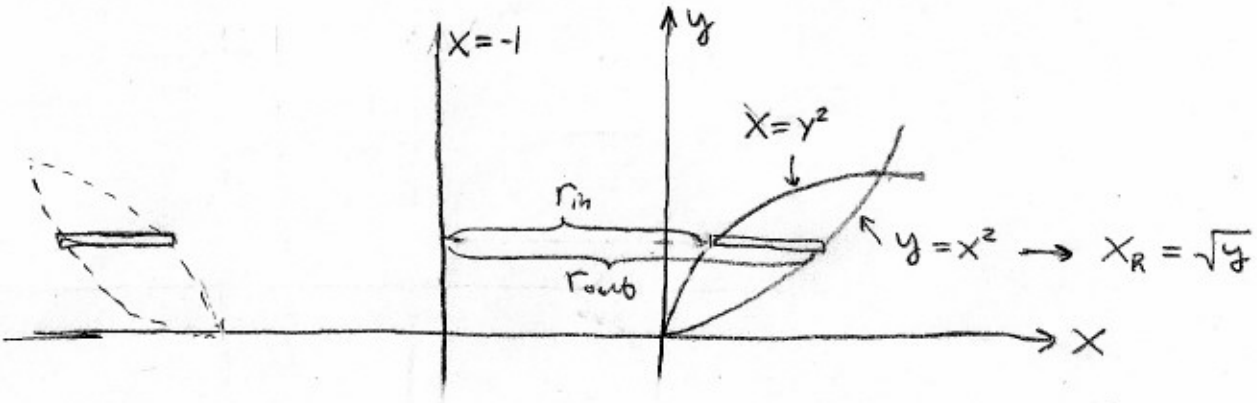
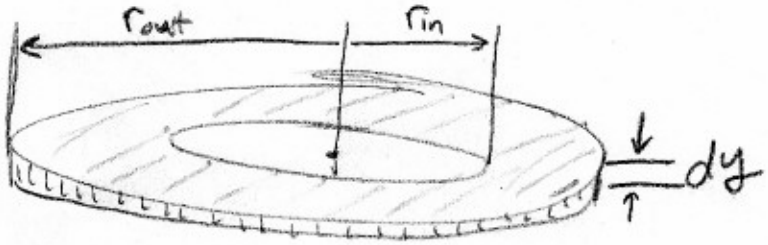
Homework Quiz #11 §6.2 pg. 457 2/15/06

Find volume of solid obtained from rotating the region bounded by $y = x^2$ and $x = y^2$ about $x = -1$.





$r_{in} = X_L + 1 = y^2 + 1$

$r_{outb} = X_R + 1 = \sqrt{y} + 1$

$$A = \pi(r_{out}^2 - r_{in}^2) = \pi\left((\sqrt{y}+1)^2 - (y^2+1)^2\right)$$
$$= \pi\left(y + 2\sqrt{y} + 1 - y^4 - 2y^2 - 1\right)$$
$$= \pi\left(y + 2\sqrt{y} - y^4 - 2y^2\right)$$

Now the volume of a typical washer is $dV = A\,dy$ thus,

$$V = \int_0^1 \pi\left(y + 2\sqrt{y} - y^4 - 2y^2\right)dy$$

$$= \pi\left(\tfrac{1}{2}y^2 + \tfrac{4}{3}y^{3/2} - \tfrac{1}{5}y^5 - \tfrac{2}{3}y^3\right)\Big|_0^1$$

$$= \pi\left(\tfrac{1}{2} + \tfrac{4}{3} - \tfrac{1}{5} - \tfrac{2}{3}\right)$$

$$= \pi\left(\frac{15 + 40 - 6 - 20}{30}\right)$$

$$= \pi\left(\tfrac{29}{30}\right) = \boxed{\frac{29\pi}{30}}$$