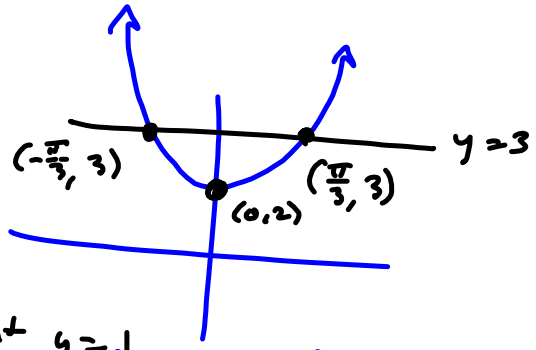
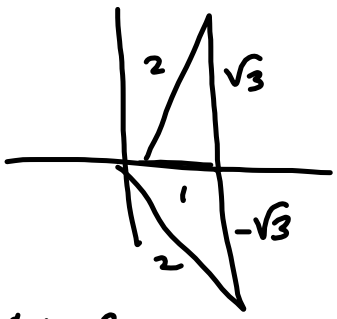
#13

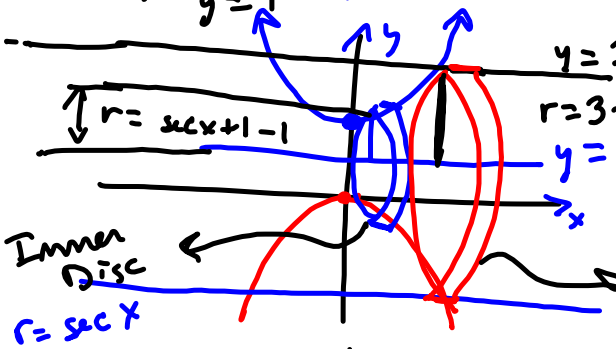
$y = \sec x + 1$, $y = 3$

$\sec x = 2$ is when they're equal





about $y = 1$



$\sec x = 2$ @ $x = \frac{\pi}{3}, \frac{5\pi}{3}$ $(-\frac{\pi}{3})$

$2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$

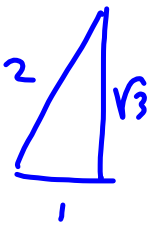
Inner Disc $r = \sec x$

Outer Disc $r = 2$

$$\pi \int_a^b \left(\text{Outer}^2 - \text{Inner}^2\right)$$

$$= \pi \int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \left(2^2 - (\sec(x))^2\right) dx$$ is symmetric interval. Even func.

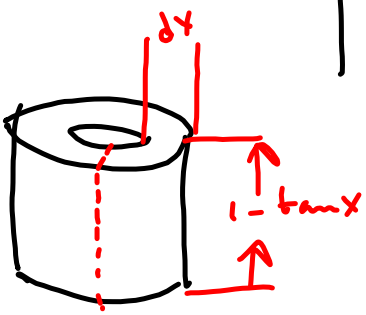
$$= 2\pi \int_0^{\frac{\pi}{3}} \left(4 - \sec^2 x\right) dx = 2\pi \left[4x - \tan x\right]_0^{\frac{\pi}{3}}$$



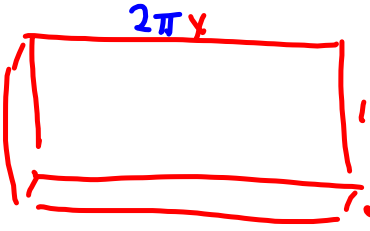
$$= 2\pi \left[4\frac{\pi}{3} - \tan\left(\frac{\pi}{3}\right) - \left(4(0) - \tan(0)\right)\right]$$

$$= 2\pi \left[\frac{4\pi}{3} - \sqrt{3}\right] = \boxed{\frac{8\pi^2}{3} - 2\pi\sqrt{3}}$$

#31 $y = \tan x$, $y = 0$, $x = \frac{\pi}{4}$



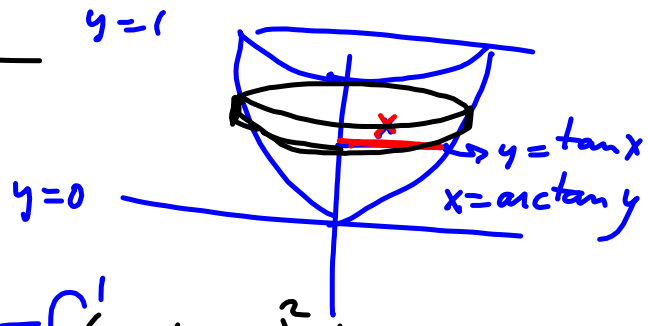
5.2



5.3

New Version

Change Question to about y-axis



$$\pi \int_0^1 (\arctan(y))^2 \, dy$$

$$2\pi \int_0^{\frac{\pi}{4}} x\,(1 - \tan x)\, dx$$

cylindrical shell