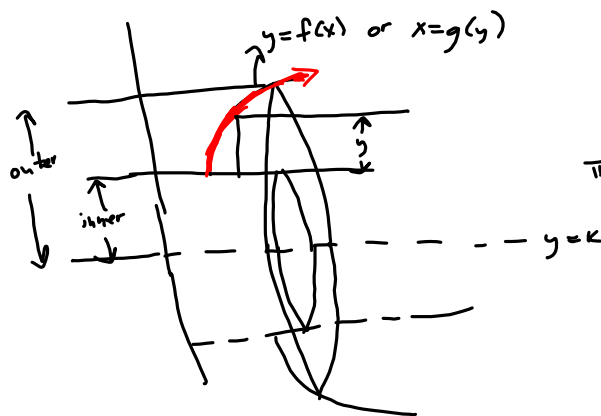


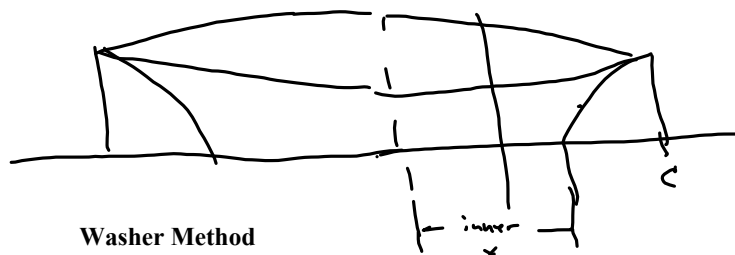


The basic idea

$$\pi \int y^2 dx = \pi \int f(x)^2 dx$$

Washer Method

$$\pi \int (\text{outer}^2 - \text{inner}^2) dx$$



Washer Method

$$\begin{aligned} & \int (\text{outer}^2 - \text{inner}^2) dy \\ &= \int ((k-d)^2 - (x-d)^2) dy \\ &= \int ((k-d)^2 - (g(y)-d)^2) dy \end{aligned}$$

The Basic idea:

$$\pi \int x^2 dy = \pi \int g(y)^2 dy$$

$$\begin{aligned} y &= \sin(x) \Rightarrow \\ x &= \arcsin(y) \end{aligned}$$

$$\begin{aligned} y &= \frac{1}{x} \Rightarrow x = \frac{1}{y} \\ \text{area} &= \int_1^2 \frac{1}{x} dx = (2-1)\left(\frac{1}{2}\right) + \int_{\frac{1}{2}}^1 \left(\frac{1}{y} - 1\right) dy \\ \pi \int_1^2 y^2 dx &= \pi \int_{\frac{1}{2}}^1 \left(\frac{1}{y}\right)^2 dy \end{aligned}$$

$$\begin{aligned} \text{about } x\text{-axis} & \quad \pi \int_0^{\frac{1}{2}} ((2^2 - y^2) dy + \pi \int_{\frac{1}{2}}^1 ((\frac{1}{y})^2 - 1^2) dy \end{aligned}$$