

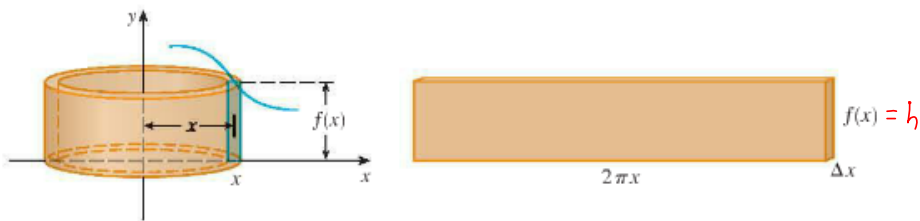
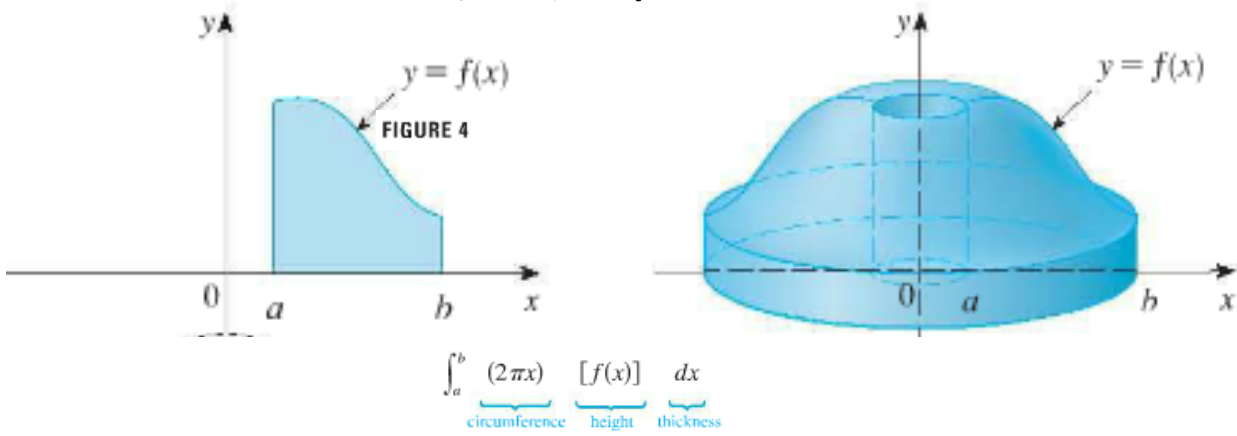
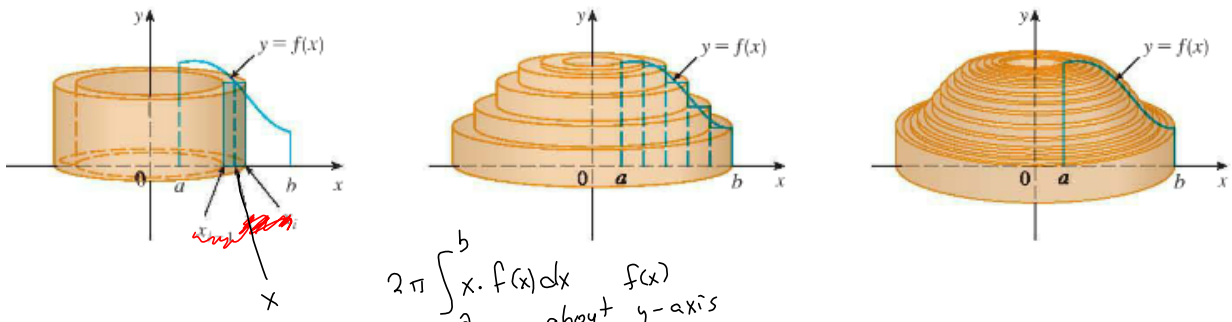
FIGURE 2

§5.3 volumes of Solids of Revolution by cylindrical shells.

Volume of material used to make this section of clay pipe

$$V = ?$$

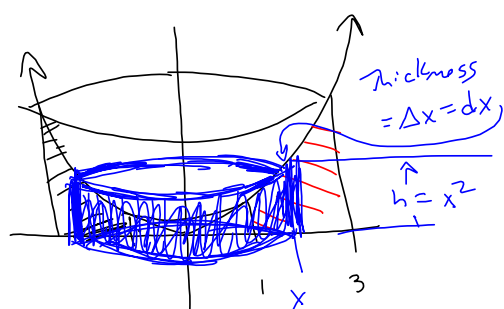
§5.2: Washer method would be $\pi r_2^2 h - \pi r_1^2 h$
But we're switching gears!



2 The volume of the solid in Figure 3, obtained by rotating about the y -axis the region under the curve $y = f(x)$ from a to b , is

$$V = \int_a^b 2\pi x f(x) dx \quad \text{where } 0 \leq a < b$$

$f(x) = x^2$ about y -axis from $x=1$ to $x=3$, $y=0$, $y=x^2$



$$2\pi r h \Delta r$$

$$= 2\pi x \cdot x^2 \cdot dx$$

$$2\pi \int_1^3 x^3 dx = 2\pi \left[\frac{x^4}{4} \right]_1^3$$

Sometimes Discs are better:

$$y = f(x) \text{ about } x\text{-axis}$$

$$x = g(y) \text{ about } y\text{-axis}$$

Sometimes Shells are Better.

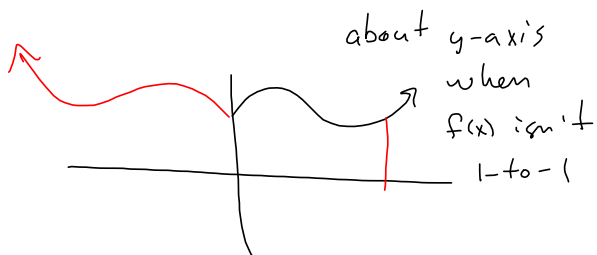
$$y = f(x) \text{ about } y\text{-axis}$$

$$x = g(y) \text{ about } x\text{-axis}$$

Crossover: when $y = f(x)$ or $x = g(y)$ can be inverted.

$$y = \sqrt[3]{x} \iff x = y^3$$

Shell method only:



Disc method only

