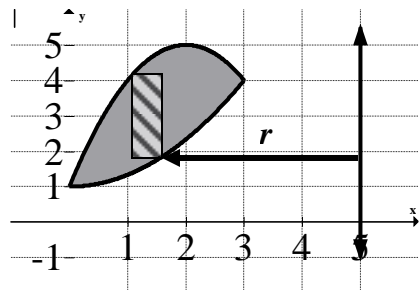
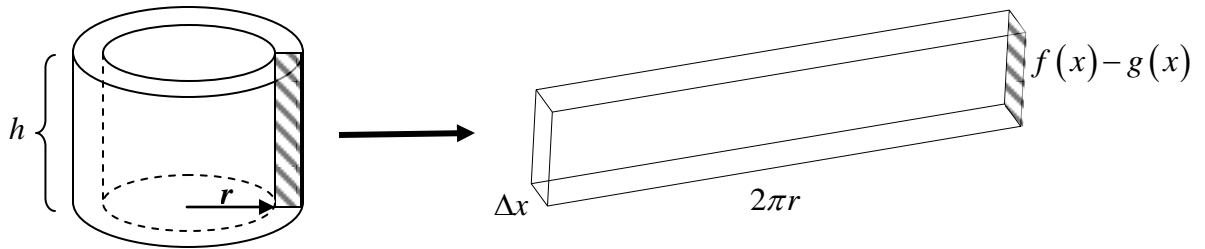
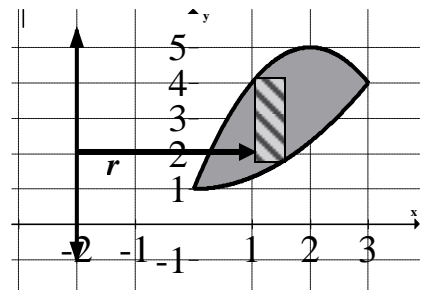


## Volume of Revolution: Cylindrical Shells Method

$$V = \int_{x_1}^{x_2} 2\pi \cdot \text{radius} \cdot \text{height} \cdot dx \quad \text{or} \quad V = \int_{y_1}^{y_2} 2\pi \cdot \text{radius} \cdot \text{height} \cdot dy$$

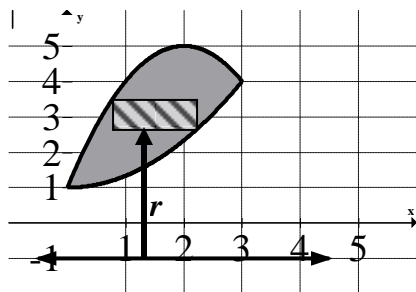


Vertical Axis  
of Revolution

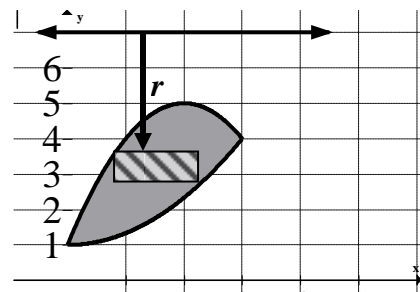


$$V = \int_{x_1}^{x_2} 2\pi \underbrace{(c-x)}_{\text{radius}} \underbrace{(f(x)-g(x))}_{\text{height}} dx$$

$$V = \int_{x_1}^{x_2} 2\pi \underbrace{(x-c)}_{\text{radius}} \underbrace{(f(x)-g(x))}_{\text{height}} dx$$



Horizontal Axis  
of Revolution



$$V = \int_{y_1}^{y_2} 2\pi \underbrace{(y-c)}_{\text{radius}} \underbrace{(f(y)-g(y))}_{\text{height}} dy$$

$$V = \int_{y_1}^{y_2} 2\pi \underbrace{(c-y)}_{\text{radius}} \underbrace{(f(y)-g(y))}_{\text{height}} dy$$