6.4: Volume by Shells

Volume by the Shell Method

Let f and g be continuous functions with $f(x) \geq g(x)$ on $[a, b]$. If R is the region bounded by the curves $y = f(x)$ and $y = g(x)$ between the lines $x = a$ and $x = b$, the volume of the solid generated when R is revolved about the y-axis is

$$V = \int_a^b \underbrace{2\pi x}_{\substack{\text{shell} \\ \text{circumference}}} \underbrace{(f(x) - g(x))}_{\substack{\text{shell} \\ \text{height}}} dx.$$