Volume of a Revolution

Patrick Chen

Nov 13, 2024

The volume of a function rotated around the x-axis is given by:

$$\lim_{n\to\infty}\sum_{i=1}^{n}\pi f(x_i)^2\Delta x$$
$$=\int_a^b \pi f(x)^2\ dx$$

The volume of a function rotated around the y-axis is equivalent to rotating around the x-axis, using the inverse function. The volume is given by:

$$\lim_{n\to\infty}\sum_{i=1}^{n}\pi f^{-1}(x_i)^2\Delta x$$
$$=\int_a^b \pi f^{-1}(x)^2\ dx$$

When finding the volume of a region bounded by two by f and g:

$$\int_a^b \pi f(x)^2\ dx-\int_a^b \pi g(x)^2\ dx$$

For rotating around any arbitrary horizontal line located at y_0:

$$\int_a^b \pi(f(x)-y_0)^2-\pi(g(x)-y_0)^2\ dx$$