The Disk method:

Volume of disk = π . (radius)^2 . thickness = $\pi \left[f(x)\right]^2 dx$

$$\text{Volume} = \pi \int_a^b \left[f(x)\right]^2 dx \, .$$

Example 1. Find the volume of the solid obtained by revolving the region bounded by $y = \sqrt{x}$, $x = 4$ and the x-axis about the x-axis.

The Washer method:

Volume of a washer $= \pi \, . \left([f(x)]^2 - [g(x)]^2 \right) . \, dx$

$$\text{Volume} = \pi \int_a^b \left([f(x)]^2 - [g(x)]^2 \right) dx$$

Example 2. Find the volume of the solid obtained by revolving the region bounded by $y = 1$ and $y = x^2$ about the x-axis.

Example 3. Find the volume of the solid obtained by revolving the region bounded by $y = x + 3$ and $y = x^2 + 1$ about the x-axis.

The Shell method:

Volume of a shell = 2π . (radius) . (height) . (thickness) = $2\pi x\Big(f(x) - g(x)\Big)\,dx$

$$\text{Volume} = 2\pi \int_a^b x\Big(f(x) - g(x)\Big)\,dx$$

Example 4. Find the volume of the solid obtained by revolving the region bounded by $x = \sqrt{y}$, $y = 1$ and the y-axis about the y-axis.

Example 5. Find the volume of the solid obtained by revolving the region bounded by $y = x^{2/3}$, $x = 8$ and the x-axis about the y-axis.