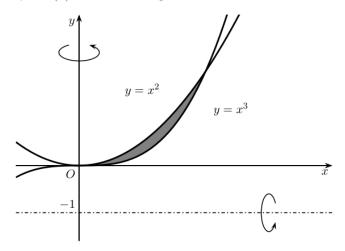
Calculus Volume of Solids of Revolution

The formula for finding the volume of a solid of revolution around an axis is $\pi \int_a^b f(x)^2 dx$.

Consider this question:

Find the volume of the solids generated by revolving the region bounded by $y = x^2$ and $y = x^3$ (i) about the y-axis, and (ii) about the line y = -1.



The intersection points are (0,0) and (1,1) .

i) To revolve the region around the <u>vertical</u> y axis, we need to represent the equations in terms of x. The equations can be rewritten as $x=\sqrt{y}$ and $x=\sqrt[3]{y}$.

Volume:
$$\pi \int_{0}^{1} (\sqrt[3]{y})^{2} dy - \pi \int_{0}^{1} (\sqrt{y})^{2} dy$$

ii) To revolve the region around the <u>horizontal</u> line y=1, we need to represent the equations in terms of y. The equations are $y=x^2$ and $y=x^3$.

Also, the formula of the volume of a curve around a line y=a is $\pi \int_a^b [f(x)-a]^2 dx$.

Volume:
$$\pi \int_{0}^{1} [x^{2} - (-1)]^{2} dx - \pi \int_{0}^{1} [x^{3} - (-1)]^{2} dx$$

Volume (Simplified):
$$\pi \int_{0}^{1} [(x^2+1)^2 - (x^3+1)^2] dx$$