Assume that a solid object is suspended above the x-axis from \( x=a \) to \( x=b \). Assume that the area \( A(x) \) of a cross-sectional slice, taken perpendicular to the x-axis at \( x \) is known.

Then

\[
\text{Volume} = \int_a^b A(x) \, dx
\]

### Solid of Revolution

\[
y = f(x)
\]

\[
\text{slice has area } A(x)
\]
Consider a region $R$ below the graph of $y=f(x)$ and above the interval $[a,b]$. Create a solid of revolution by revolving $R$ about the $x$-axis. The cross-sectional slice at $x$ is a circle with area

$$A(x) = \pi r^2 = \pi (f(x))^2.$$ 

So

$$\text{Vol} = \int_a^b \pi (f(x))^2 \, dx.$$