## Volume by Washer Method

The disk method can be extended to cover solids of revolution with holes by replacing the representative disk with a representative washer. The washer is formed by revolving a rectangle about an axis.

Washer Method:
If $r$ is the inner radius and $R$ is the outer radius, then
$V=\pi \int_{a}^{b}\left[R(x)^{2}-r(x)^{2}\right] d x$
or,
$V=\pi \int_{a}^{b} R(x)^{2} d x-\pi \int_{a}^{b} r(x)^{2} d x$

8. Find the volume of the solid formed by revolving the region bounded by the graphs of $y=\sqrt{x}$ and $y=x^{2}$ about the...
a) $x$-axis.
b) $y$-axis
c) $\operatorname{line} y=-1$
d) line $y=3$
e) the line $x=2$
f) the line $x=-3$
9. Find the volume of the solid formed by revolving the region bounded by the graphs of $y=x^{2}+1, y=0, x=0$, and $x=1$ about the $y$-axis.
10. Find the volume of the solid generated by revolving the region bounded by $y=x^{2}$, $y=0$, and $x=2$ about the line $x=3$.

