AP Calculus   Name _____

7.2 Volume: Disk and Washer Methods – day 1
(rotations around an axis)

If a region in the plane is revolved about a line, the resulting solid is a <u>solid of revolution</u>, and the line is called the <u>axis of revolution</u>.

Volume of disk = (area of disk)(width of disk) =

<u>The Disk Method</u>

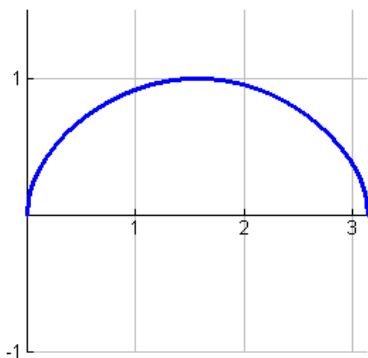<u>Horizontal Axis of Revolution</u>   <u>Vertical Axis of Revolution</u>

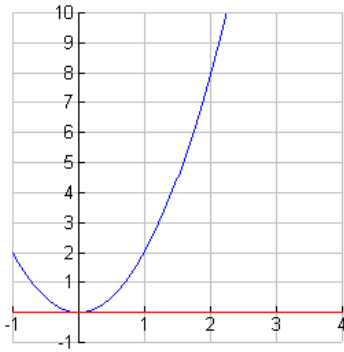$$V = \pi \int_a^b [R(x)]^2 \, dx$$ $$V = \pi \int_c^d [R(y)]^2 \, dy$$

R(x) = _____   R(y) = _____

1) Find the volume of the solid formed by revolving the region bounded by the graph of $f(x) = \sqrt{\sin x}$ and the x-axis ($0 \le x \le \pi$) about the x-axis.
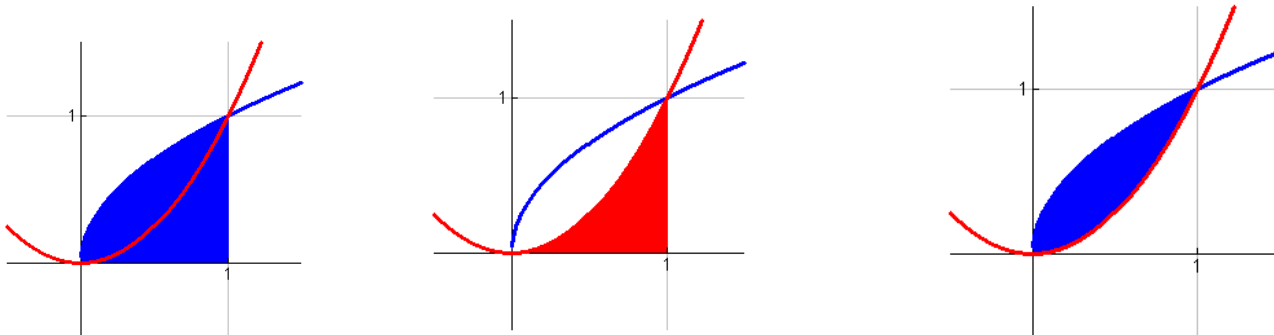
2) Find the volume of the solid generated by revolving the region bounded by the graphs of $y = 2x^2$, $y = 0$ and $x = 2$ about the x-axis.

3) Find the volume of the solid generated by revolving the region bounded by the graphs $x = y^2$, $x = 0$, $y = 0$ and $y = 1$ about the y-axis.

The Washer Method

The Washer Method

Horizontal Axis of Revolution	Vertical Axis of Revolution

$$V = \pi \int_a^b [R(x)]^2 \, dx - \pi \int_a^b [r(x)]^2 \, dx \qquad\qquad V = \pi \int_c^d [R(y)]^2 \, dy - \pi \int_c^d [r(y)]^2 \, dy$$

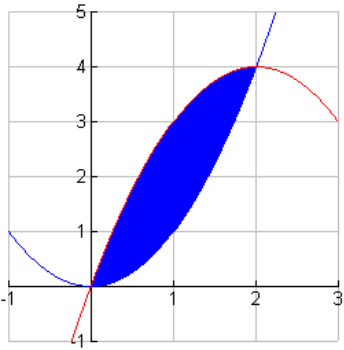R(x) = Top – Bottom of Outer Region   R(y) = Right – Left of Outer Region

r(x) = Top – Bottom of Inner Region   r(y) = Right – Left of Inner Region

1) Find the volume of the solid formed by revolving the region bounded by the graphs of $y = \sqrt{x}$ and y = x² about the x-axis.
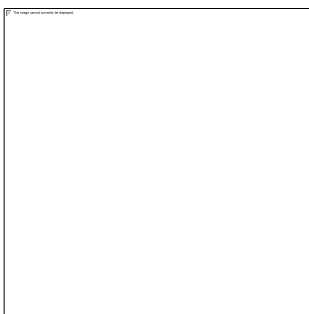
2) Find the volume of the solid formed by revolving the region bounded by the graphs of $y = x^2$ and $y = 4x - x^2$ about the x-axis.

3) Find the volume of the solid formed by revolving the region bounded by the graphs of $x = 3 - y^2$ and $x = 1$ about the y-axis.