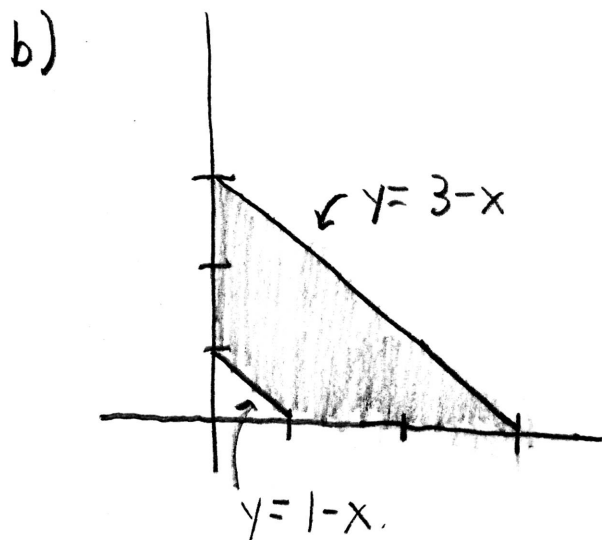
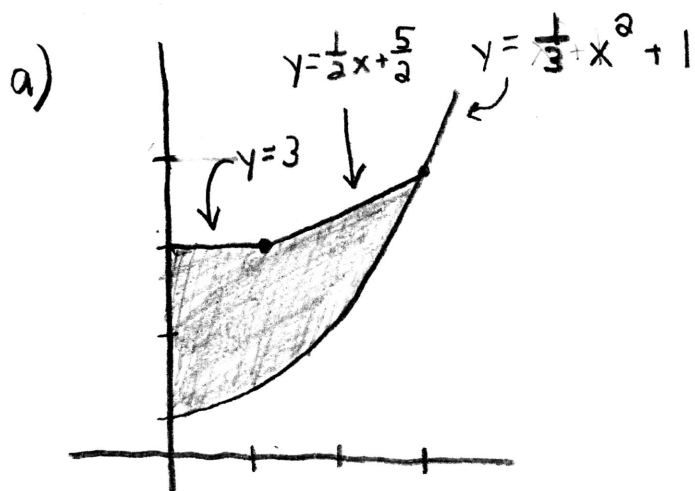


Worksheet #2: Areas, Washer, Shell Method.

I. Areas.

1. Find the area of the region bounded by $y=4x$, $y=-4$, and $y=12-2x$.
2. Find the area bounded by $y=18-3x^2$ and $y=x^2+2$.
3. A region in quadrant I is bounded by $y=\sqrt{x}$, $y=0$, and $x=4$.
 - a) Find the area of this region
 - b) Find a value of a so the part of the region above $y=ax$ has the same area as the part of the region below it.
4. A region is bounded by $y=\arccos x$, $y=\arcsin x$ and $x=0$.
 - a) Set up an integral with respect to x that would give the area of this region. Can you evaluate this?
 - b) Set up an integral or integrals with respect to y that if evaluated would give the area of this region.
 - c) Find the area of the region.

5. Set up an integral or integrals that would give the area of the following:



II. Washer and Shell Method

- The region bounded by $y=3x$, $x=0$, $y=6$ is revolved about the following axes. In each case, set up the volume of the solid formed using both washer and shell method.
 - $x=0$
 - $y=0$
 - $y=6$
 - $x=-5$
- The region bounded by $y=10-3x^2$, $x=0$, and $x=1$ is revolved about the axes listed below. In each case:
 - set up an integral that gives the volume of the resulting solid
 - Find the volume.
 - $x=0$
 - $y=0$
 - $y=-5$
 - $x=2$

3. The region bounded by $y = \sqrt{x}$, $y = 3 - 2x$, and $y = 0$ is revolved about the axes listed below. In each case:

(i) Set up an integral that gives the volume of the resulting solid.

(ii) Find the volume.

a) $x = 0$

c) $y = 10$

b) $y = 0$

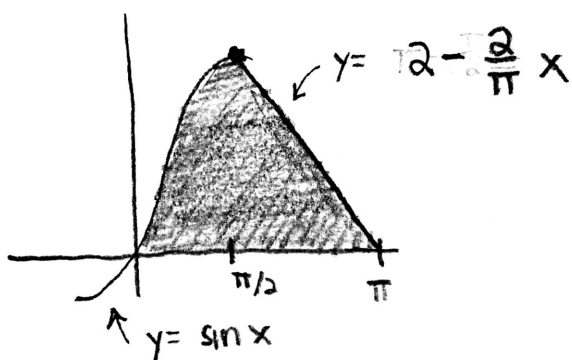
d) $x = -1$

4. The region bounded by $y = 6x^2 - 10$, $y = 8$, and $x = -1$ is revolved about the line $x = 4$.

a) Find the volume of the solid.

b) Find a value of a so the part of the region to the right of $x = a$ has the same volume as the part of the region to left of $x = a$ when rotated about $x = 4$.

5. For the region shown below, set up an integral that gives the volume of the solid when the region is rotated by the axes given:



a) $x = 0$

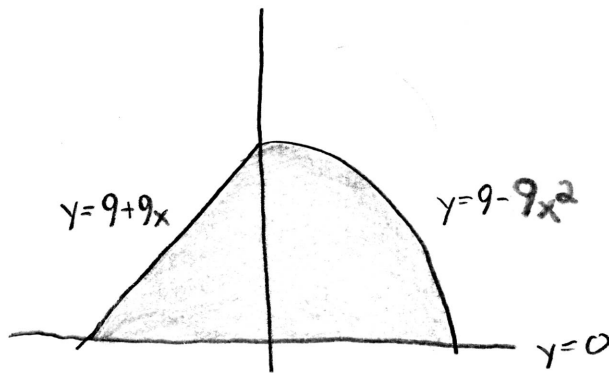
b) $y = 0$

c) $x = 16$

d) $y = -4$

Worksheet #2 Addendum: Volume by Slicing

6. The base of a solid is the region in the xy plane bounded by $y = 4x$, $y = 2x + 8$, and $x = 0$. Find the volume of the solid if cross-sections through it that are perpendicular to the x -axis are:
- Squares
 - Equilateral Triangles
 - Semicircles
 - Which volume is largest? Why should this be intuitive?
7. The base of a solid is the region in the xy plane bounded by the curves $y = 9 - 9x^2$, $y = 9 + 9x$, and $y = 0$ as shown below:



- Find the volume of the solid if cross-sections through it are squares perpendicular to
 - the x -axis
 - the y -axis.
- Set up, but do not evaluate, an integral or integrals that would give the volume of the solid if cross-sections through it that are perpendicular to the y -axis are semicircles.