Group Work 1, Section 6.1
Practice with Areas

For each of the following problems, first sketch the relevant area, then write out the definite integral that will give its exact value.

1. The area bounded by $y = 2^x$, $y = 8$, and the y-axis.

2. The area bounded by $y = 3^x$, $x = 2$, the x-axis, and the y-axis.

3. The area in the first quadrant between $x^2 + y^2 = 1$ and $x^{1/2} + y^{1/2} = 1$.

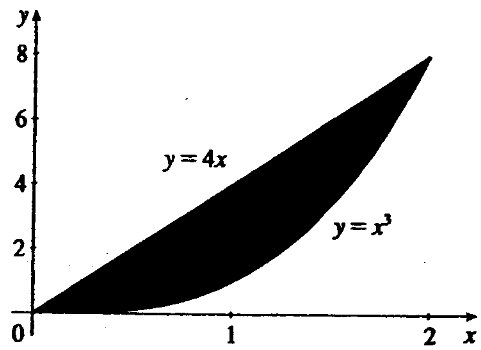
4. The area in the first quadrant bounded by the curves $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and $x = -\frac{y^2}{4} + 1$.

5. The area between the curves $y = \cos x$ and $y = \frac{1}{2}x - 1$, bounded on the left by the y-axis.

6. The area bounded by the curves $y = x^2 - 4$ and $y = \begin{cases} \frac{1}{2}x + 1 & \text{if } x \leq 0 \\ -\frac{1}{2}x + 1 & \text{if } x > 0 \end{cases}$

The Revolution Will Not Be Televised

Consider the following region:



For each problem below, set up an integral to compute the volume of the solid obtained by rotating this region about the given line.

1. The $x-axis$

2. $y=-1$

3. $y=9$

4. The $y-axis$

5. $x=2$

6. $x=-1$

AP Calculus
More Volume Problems

Name____________________________
Block__________Date______________

1. FIND THE VOLUME OF $y = f(x) = 2x$, when rotated about the x axis and bounded by x = 2.

2. Find the volume formed by revolving the hyperbola xy = 6 from x = 2 to x = 4 about the x axis.

3. Find the volume of the solid generated by revolving $y^2 = 4x$ around the x axis. The region is bounded by the x axis, x = 0 and x = 4.

4. Find the volume of the solid generated by revolving about the x axis, the region bounded by curves $y = x^2$ *and* $y = 2 - x^2$.

5. Rotate the area bounded by y = 2x, and x = 2 around the y axis. (Find the volume).

6. (Shells) Find the volume of the solid generated by revolving about the y axis, the region bounded by the parabola $y = -x^2 + 6x - 8$ and the x axis.

7. (Shells, preferred) Why? Find the volume of the solid generated by revolving about the y axis the region bounded by the parabola $y = x^2$, y axis and line x = 2

8. Find the volume generated by revolving $y = 3x^2 - x^3$ from x = 0 to x = 3. around the y axis

9. A solid has a circular base of radius 1. Parallel cross sections $\perp$ to the base are equilateral triangles. Find the volume of the solid.

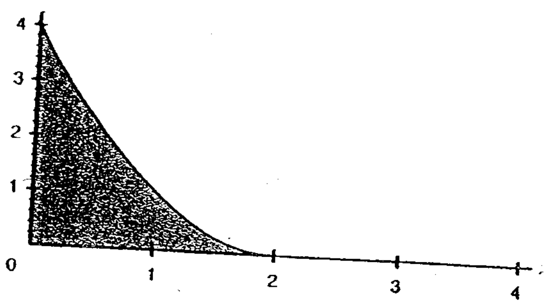
AP Calculus-- Questions on Area & Volume

1) Find the area of the region bounded by the curves $y = |x|$ *and* $y = 2 - x^2$.

2) Find the area of the region bounded by $x = 2y^2 - 5$ *and* $x = y^2 + 4$.

3) Find the area of the region bounded by the curve $y = f(x) = 2x^3 - 6x^2 - 2x + 6$ and $y(x) = -x^3 + 3x^2 + x - 3$.

4) The region R is the region in the first quadrant bounded by the curves $y = x^2 - 4x + 4$, x = 0 and y = 0 as pictured below. If the vertical line x = h divides the region R into two regions of equal area, then h = ___________.



5) The region bounded by the x axis, the y axis, and the portion of the curve $y = 4 - x^2$ in the first quadrant is revolved around the y axis. Find the volume of this solid of revolution.

6) The curve $y = \sqrt{1 - x^2}$ between x = -1 and x = 1 is revolved around the x axis. Find the volume of the resulting solid.

7) The region bounded by $y = \sin x,\ y = \cos x,\ x = 0,\ and\ x = \pi/4$ is revolved around the x axis. Find the volume of this solid of revolution.

8) A region R is bounded by the curves $y = \sqrt{x}\ \ and\ \ y = x^3$. The solid formed by revolving region R around the y axis has a volume of?

9) The base of a solid is the region in the second quadrant enclosed by the graph of $y = x^3 + 7x^2$ and the x axis. If every cross section perpendicular to the x axis is a square, find the volume.

10) The base of a solid is bounded by $y = x^2$ and the line y = d. Every cross section of the soild perpendicular to the y axis is an isosceles triangle with a height that is three times its base (with the short leg lying in the xy plane). If the volume of the solid is 75, what is the value of d?