

Warm-Up Problems and Lecture Problems
March 12, 2003

1. Consider the function $y = x^2$.
 - (a) For a given x -value, consider the vertical line segment from the x -axis to the graph of $y = x^2$. Let $r_1(x)$ denote the length of this line segment. Find a nice expression for $r_1(x)$.
 - (b) For a given y -value, consider the horizontal line segment from the y -axis to the graph of $y = x^2$. Let $r_2(y)$ denote the length of this line segment. Find a nice expression for $r_2(y)$.
2. Find the area of an equilateral triangle with side length a .

Lecture Problems

3. Take the region bounded by $y = e^x$, the x -axis, $y = 0$ and $y = 1$. Rotate the region around the x -axis and compute the volume.

Here are the steps:

- (a) Draw the region.
- (b) For a given x -value, find the height of the vertical line segment from the x -axis to the curve $y = e^x$. (This will be the radius of the circular cross section).
- (c) Find the area of a cross section ($A = \pi r^2$).
- (d) Set up the integral representing the volume.
- (e) Compute the integral.