(6.3) Volumes by Cylindrical Shells

Full Name: ______________________________

1. Sketch the region enclosed by the graphs of the given equations. Then, use a definite integral to find the exact value of the volume of revolution obtained by rotating the region about the given axis of revolution.

   (a) Note we are dealing with functions of x revolved about the y-axis. As such, we will use the method of cylindrical shells to determine the volume of this region. Since one of our functions of x is the x-axis, the height f our cylindrical shells will simply be $\frac{1}{\sqrt{x}}$. Since we are revolving about the y-axis (and not some other axis parallel to the y-axis), the radius of our shell will be (simply) x .

   (b) Note that we have two functions of x and we are revolving about an axis parallel to the y-axis. As such, we will need cylindircal shells. Since our axis of revolution is one unit farther from our region than the y-axis, we will need to account for this in the radius of each shell.

   (c) Similar to (b) .

   (d) Similar to (b) , but with the axis of rotation being three units farther away from our region than the y-axis. Also, we are not dealing with a completely enclosed region in this case; here, we are given the bounds along the x-axis to be $x = 0$ and $x = 4$.

   (e) Similar to (d) , but with the axis of rotation being two units farther away from our region than the y-axis.

   (f) Analogous to (d) and (e) , although we are dealing with functions of y and an axis parallel to the x-axis (which will still demand shells).