(6.2) Volume by Disks & Washers

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) Since we have functions of x and we are revolving around the x-axis, we will use disks/washers to compute. To find our bounds, we will need to determine intersection points.

   (b) Similar to (a), but we must note that we are revolving around an axis parallel to the x-axis (and not the x-axis itself. As such, we need to properly account for this measurement in our integral. In particular, relative to the line $y = -1$ each function will extend one unit higher thn they would have relative to the x-axis.

   (c) Similar to (b).

   (d) Note that one of our curves defines the x-axis (namely the curve $y = 0$). Also note that we are revolving about the x-axis. As such, this region will have no void in the middle and each slice will simply be a disk.

   (e) Note that our region between $y = e^x$ and $y = 0$ lies above the x-axis, and also note that the axis we are revolving about (namely $y = -2$) lies below the x-axis. As such, we will need to accurately account for the fact that $y = e^x$ and $y = 0$ are each two units higher relative to $y = -2$ than they are relative to the x-axis.

   (f) Analogous to (e), except we are dealing with functions of y instead of functions of x. In addition, we are revolving about an axis 1 unit away from the y-axis (rather than 2 units away from the a-axis, as in (e)-part).