Note ♯2: Volumes (Disks and Washers)

Problem 1. Find the volume of the solid obtained by rotating the region bounded by $y = -x^2+1$, $y = 0$; $x = 0$; about the x axis.

Problem 2. Find the volume of the solid obtained by rotating the region bounded by $y = -x^2+1$, $y = 0$; $x = 0$; about the y axis.

Problem 3. Find the volume of the solid obtained by rotating the region bounded by $y = \ln x$, $y = 0$; $x = e$; about the x axis (you may use the fact that $\int \ln x dx = x \ln x - x + C$).

Problem 4. Find the volume of the solid obtained by rotating the region bounded by $y = \ln x$, $y = 0$; $x = e$; about the y axis.

Problem 5. Find the volume of the solid obtained by rotating the region bounded by $y = -x^2+5$, $y = 1$; $x = 1$; about the line $x = -1$.

Problem 6. Find the volume of the solid obtained by rotating the region bounded by $y = -x^2+5$, $y = 1$; $x = 1$; about the line $y = -1$.

Problem 7. Find the volume of the solid whose base is the region bounded by $y = \sqrt{\cos x}$, $y = 0$, $x = 0$ and whose cross sections perpendicular to the x axis are circles.

8

Problem 8. Find the volume of the solid whose base is the region bounded by $y = -x^2 + 1$, $y = 0$, $x = 0$ and whose cross sections perpendicular to the y axis are squares.

Problem 9. Find the volume of the solid whose base is the region bounded by $y = \sqrt{x}$, $y = x$ and whose cross sections perpendicular to the y axis are rectangles with height equal to twice the base.

10

Problem 10. Find the volume of the solid whose base is an equilateral triangle of side length one and whose cross sections parallel to one of the sides are squares.