Note ♯2 (Volumes (Disks, Washers, and by Slicing))

[Disks and Washers]

(1) Find the volume of the solid obtained by rotating the region bounded by $y = e^x$, $y = x+1$, and $x = 2$ about the x-axis.

(2) Find the volume of the solid obtained by rotating the region bounded by $y = \ln x$, $x = e$, and $y = 0$ about the y-axis.

(3) Find the volume of the solid obtained by rotating the region bounded by $y = \frac{1}{x}$, $y = \sqrt{x}$, and $x = 4$ about the line $y = 3$.

(4) Find the volume of the solid obtained by rotating the region bounded by $x = y^2 + 3$ and $x = 7$ about the line $x = 7$.

(5) Find the volume of the solid obtained by rotating the region bounded by $y = x^3$, $y = 4x$, and $x \geq 0$ about the line $x = -3$.

(6) Find the volume of the solid obtained by rotating the region bounded by $y = \sqrt{5-x}$, $x = 1$, and $y = 0$ about the line $y = 7$.

[Slicing]

(7) Find the volume of the solid whose base is bounded by the curves $y = x^2 - 4$ and the x-axis. Cross-sections perpendicular to the y-axis are rectangles with the height double the length of the base.

(8) Find the volume of a right-circular cone with height 5 and radius 3 of the top of the cone.

(9) Find the volume of a solid whose base is bounded by the curves $y = e^x$, $x = 0$, $y = 0$, and $x = 1$, and cross-sections perpendicular to the x-axis are equilateral triangles.

(10) Find the volume of a solid whose base is bounded by the curves $y = \sqrt{x+5}$, $x = 4$, and $y = 0$, and the cross-sections perpendicular to the y-axis are semicircles.

(11) Find the volume of a solid whose base is a circle of radius 5 and cross-sections are squares.

(12) Find the volume of a solid whose base is a triangular region with vertices $(0, 6)$, $(-3, 0)$, and $(3, 0)$ and cross-sections perpendicular to the y-axis are isosceles triangles with height equal to half the base.