

Calculus I
Practice Problems 11

1. A solid is formed over the region in the first quadrant bounded by the curve $y = \sqrt{10-x}$ so that the section by any plane perpendicular to the x -axis is a semicircle. What is the volume of this solid?
2. A solid is formed over the region in the first quadrant bounded by the curve $y = \sqrt{4-x}$ so that the section by any plane perpendicular to the x -axis is a square. What is the volume of this solid?
3. A solid is formed over the region in the first quadrant bounded by the curve $y = 2x - x^2$ so that the section by any plane perpendicular to the x -axis is a semicircle. What is the volume of this solid?
4. The region in the first quadrant bounded by $y = \sqrt{x^2 - 1}$, $y = 0$, $x = 1$, $x = 4$ is revolved around the x -axis. Find the volume of the resulting solid.
5. Find the volume of the solid obtained by rotating about the y -axis the region bounded by $y = x^2$, $x = 2$ and the x -axis.
6. The region in the first quadrant under the curve $y^2 = 2x - x^2$ is rotated about the y -axis. Find the volume of the resulting solid.
7. The region in the first quadrant bounded by $y = x^4$ and $x = 1$ is revolved around the y -axis. Find the volume of the resulting solid.
8. The region in the first quadrant bounded by $y = x - x^2$ and $y = x - x^3$ is revolved around the x -axis. Find the volume of the resulting solid.
9. The *average value* of a function $y = f(x)$ defined over an interval $[a, b]$ is defined to be

$$y_{\text{ave}} = \frac{1}{b-a} \int_a^b f(x) dx .$$

- (If, for example, the graph of $y = f(x)$ were a histogram of the grades on an exam, then y_{ave} would be the average grade.) Find the average of $y = \sin x$ over the interval $[0, \pi]$.
10. Let $g(x) = x^2 + x^3$ for x in the interval $0 \leq x \leq 10$. Find the average, or mean, value of g on the interval. Find the average slope of the graph of $y = g(x)$ on the interval.