1. The region *R* in the first quadrant bounded by the parabola $y = 4 - x^2$ and the coordinate axes is revolved about the *y*-axis to produce a dome-shaped solid. Find the volume of the solid in the following ways.

a) Apply the disk method and integrate with respect to *y*.

b) Apply the shell method and integrate with respect to *x*.

2. What is the volume of the solid whose base is the region in the first quadrant bounded by $y = \sqrt{x}$, $y = 2 - x$, and the *x*-axis, and whose cross sections perpendicular to the base and parallel to the *y*-axis are semicircles?

3. What is the volume of the solid whose base is the region in the first quadrant bounded by $y = \sqrt{x}$, $y = 2 - x$, and the *y*-axis, and whose cross sections perpendicular to the base and parallel to the *x*-axis are square?

4. The region bounded by the curves $y = -x^2 + 2x + 2$ and $y = 2x^2 - 4x + 2$ is revolved about the *x*-axis. What is the volume of the solid that is generated?

5. The region bounded by the curves $y = 1 + \sqrt{x}$, $y = 1 - \sqrt{x}$, and the line $x = 1$ is revolved about the *y*-axis. Find the volume of the resulting solid by

a) Integrating with respect to *x* and

b) Integrating with respect to *y*.

6. The region bounded by the curves $y = 2e^{-x}$, $y = e^x$, and the *y*-axis is revolved about the *x*-axis. What is the volume of the solid that is generated?

7. The region bounded by the graphs of $x = 0$, $x = \sqrt{\ln y}$, and $x = \sqrt{2 - \ln y}$ in the first quadrant is revolved about the *y*-axis. What is the volume of the resulting solid?

8. The region bounded by the curves $y = \sec x$, $y = 2$, for $0 \le x \le \frac{\pi}{3}$ is revolved around the *x*-axis. What is the volume of the solid that is generated?

9. The region bounded by $y = \left(1 - x^2\right)^{-1/2}$ and the *x*-axis over the interval $\left[0, \frac{\sqrt{3}}{2}\right]$ is revolved about the *y*-axis. What is the volume of the solid that is generated?

10. The region bounded by the graph $y = 6x$ and $y = x^2 + 5$ is revolved about the line $y = -1$ and the line $x = -1$. Find the volumes of the resulting solids. Which one is greater?