Section 5.2

2. Find the volume of the solid with cross-sectional area *A*(*x*).

$A(x) = 10e^{0.01x}$, $0 \le x \le 10$

6. Find the volume of a pyramid of height 160 feet that has a square base of side 300 feet. These dimensions are half those of the pyramid in example 2.1. How does the volume compare?

10. A dome "twice as big" as that of exercise 9 (see text) has outline $y = 120 - \frac{x^2}{120}$ **for** $-120 \le x \le 120$ **(units of feet). Find its volume.**

12. A pottery jar has circular cross sections of radius $4 - \sin\frac{x}{2}$ **inches for** $0 \le x \le 2\pi$. **Sketch a picture of the jar and compute its volume.**

18. Compute the volume of the solid formed by revolving the region bounded by $y = x^2$, $y = 4 - x^2$ **about (a) the *x*-axis; (b) *y* = 4.**

20. Compute the volume of the solid formed by revolving the region bounded by $y = x^2$ **and** $x = y^2$ **about (a) the *y*-axis; (b) *x* = 1.**

22. Compute the volume (exactly if possible and estimate if necessary) of the solid formed by revolving the region bounded by y= secx,
y= 0, x=$\frac{-\pi}{4}$ and x= $\frac{\pi}{4}$ **about (a) y = 2; (b) the *x*-axis.**

26. Let *R* be the region bounded by $y = x^2$ and $y = 4$. Compute the volume of the solid formed by revolving *R* about the given line.

(a) $y = 4$ (b) the y-axis (c) $y = 6$

(d) $y = -2$ (e) $x = 2$ (f) $x = -4$

32. Suppose that the circle $x^2 + y^2 = 1$ is revolved about the *y*-axis. Show that the volume of the resulting solid is $\frac{4}{3}\pi$.

Section 5.3

4. Sketch the region, draw in a typical shell, identify the radius and height of the shell, and compute the volume for the region bounded by $y = x,\ y = -x,$ and $x = 1,$ revolved about $x = 1$.

6. Sketch the region, draw in a typical shell, identify the radius and height of the shell, and compute the volume for the region bounded by $y = x^2$ and $y = 0, -1 \le x \le 1$, revolved about $x = 2$.

8. Sketch the region, draw in a typical shell, identify the radius and height of the shell, and compute the volume for the region bounded by $x^2 + y^2 = 2y$, revolved about $y = 4$.

12. Use cylindrical shells to compute the volume of the region bounded by $x = y^2$ and $x = 4$, revolved about $y = 2$.

22. Use the best method available to find the volume of the region bounded by $y = 2 - x^2,\ y = x\,(x > 0)$ and the *y*-axis revolved about (a) the *x*-axis, (b) the *y*-axis, (c) *x* =

–1, and (d) *y* = –1.

24. Use the best method available to find the volume of the region bounded by $y = e^x - 1,\ y = 2 - x$ **and the x-axis revolved about the (a) *x*-axis and (b) *y*-axis.**

26. Use the best method available to find the volume of the region bounded by $y = \sin x$ **and** $y = x^2$ **revolved about (a) *y* = 1, (b) *x* = 1, (c) the *y*-axis, and (d) the *x*-axis.**

Section 5.4

4. Approximate the length of the curve using *n* secant lines for *n* = 2; *n* = 4.

$y = \ln x, 1 \le x \le 3$

10. Compute the arc length exactly.

$$y = \frac{1}{6}x^3 + \frac{1}{2x},\ 1 \le x \le 3$$

14. Compute the arc length exactly.

$y = 2\ln(4 - x^2),\ 0 \le x \le 1$

30. Set up the integral for the surface area of the surface of revolution, and approximate the integral with a numerical method.

$y = \sin x,\ 0 \le x \le \pi,$ revolved about the *x*-axis

32. Set up the integral for the surface area of the surface of revolution, and approximate the integral with a numerical method.

$y = x^3 - 4x, -2 \le x \le 0,$ revolved about the *x*-axis

36. Set up the integral for the surface area of the surface of revolution, and approximate the integral with a numerical method.

$y = \sqrt{x}, 1 \le x \le 2,$ revolved about the *x*-axis