**Solutions to Homework Assignments 1**

**Section 6.1; problem 40.** To use the midpoint rule partition the length of the pool into 4 equal subintervals. Each subinterval has a length of $16/4 = 4$ meters. The midpoint values are given by the lengths of the odd-numbered cross sections. Hence the approximate area is $4\,(6.2 + 6.8 + 5.0 + 4.8) = 91.2$ square meters.

**Section 6.2; problem 14.** The volume is

$$V = \int_1^3 \pi \left[(1 + 1/x)^2 - 1^2\right]\, dx = \pi \int_0^3 \left[\frac{2}{x} + \frac{1}{x^2}\right]\, dx = \pi \left(2 \ln 3 + \frac{2}{3}\right).$$

**Section 6.2; problem 24.** The inside radius is given by the curve $x = y^3$ and the outside radius by the curve $x = 4y$. Thus

$$V = \int_0^2 \pi \left[(4y)^2 - (y^3)^2\right]\, dy = \pi \left[\frac{16}{3} y^3 - \frac{y^7}{7}\, \Big|_0^2\right] = \pi(24.38)$$

**Section 6.2; problem 26.** In this problem, for each $y$, $0 \le y \le 2$, the inner radius of revolution is given by $8 - 4y$ and the outer radius of revolution is given by $8 - y^3$. Therefore,

$$\begin{aligned} V &= \int_0^2 \pi \left[(8 - y^3)^2 - (8 - 4y)^2\right]\, dy \\ &= \pi \int_0^2 \left[y^6 - 16y^3 + 64y - 16y^2\right]\, dy \\ &= \pi(39.62) \end{aligned}$$