

**Book Problems:**

- Section 5.2, Exercises 16, 18, 20
- Section 5.3, Exercises 24, 28, 34

**Additional Problems:**

**A.1. Area of a Circle.** [2 points] The graph of the function  $f(x) = +\sqrt{r^2 - x^2}$  is the upper half of a circle of radius  $r$ , hence the area of the full circle is

$$2 \int_{-r}^r \sqrt{r^2 - x^2} dx.$$

Evaluate the integral. [Hint: First use the “trig substitution”  $x = r \sin \theta$  and the trig identity  $\sin^2 \theta + \cos^2 \theta = 1$ . Then use the trig identity  $\cos^2 \theta = (\cos(2\theta) + 1)/2$ . Finally, use the substitution  $u = 2\theta$ . As  $x$  goes from  $-r$  to  $r$  we can take  $\theta$  from  $-\pi/2$  to  $\pi/2$ , hence  $u$  goes from  $-\pi$  to  $\pi$ .]