1. a) $\frac{35\pi}{18}$ rad
   b) $\frac{\pi}{36}$ rad
   c) $\frac{7\pi}{9}$ rad
   d) $\frac{\pi}{18}$ rad
   e) $\frac{5\pi}{36}$ rad
   f) $\frac{7\pi}{18}$ rad
   g) $\frac{35\pi}{18}$ rad or $\frac{-1\pi}{18}$ rad.
   h) $\frac{25\pi}{18}$ rad or $\frac{-11\pi}{18}$ rad.

2. a) 30°
   b) 75°
   c) 27°
   d) 540°
   e) ≈ 401.07° or $\left(\frac{1260°}{\pi}\right)$.
   f) –36°
   g) $\left(\frac{-360°}{\pi}\right)$
   h) ≈ 42.97° or $\left(\frac{135°}{\pi}\right)$.

3. a) In the 3rd quadrant.
   b) In the 2nd quadrant.
   c) In the 2nd quadrant.
   d) In the 1st quadrant.
   e) In the 3rd quadrant.
   f) In the 3rd quadrant.
   g) In the 3rd quadrant.
   h) In the 2nd quadrant.

4. a) 0
   b) $\frac{1}{\sqrt{3}}$
   c) 1
   d) $\sqrt{3}$
   e) Not defined.
   f) $-\sqrt{3}$
   g) –1
   h) $\frac{-1}{\sqrt{3}}$
   i) Not defined.
   j) $-\sqrt{3}$
   k) –1
   l) $\frac{-1}{\sqrt{3}}$

5. a) The period of this function is 6.
   b) [–1, 2]
   c) 1) 1　　2) 2　　3) 1

6. Ⓐ 5, Ⓑ 1, Ⓒ 2, Ⓓ 6, Ⓔ 4, Ⓕ 3

7. a) 1) Maximum: 1　　2) Minimum: –1　　3) Period: 2π
   b) 1) Maximum: 1　　2) Minimum: –1　　3) Period: 2π

8. a) 2π rad
   b) $\frac{3\pi}{2}$ rad
   c) π rad
   d) $\frac{4\pi}{3}$ rad
   e) $\frac{\pi}{6}$ rad
   f) $\frac{3\pi}{4}$ rad
   g) $\frac{3\pi}{2}$ rad
   h) ≈ 2.69 rad

9.

L	r	θ
$\frac{6\pi}{5}$	6	$\frac{\pi}{5}$
3	$\frac{5}{3}$	1.8
16	4	4
37.8	18	2.1
9	≈ 1.97	4.56
1	9	$\frac{1}{9}$

10. No, since the nature of the periodic function is that a value of the dependent variable can be associated with more than one value of the independent variable.

11. a) (–a, –b)   **b)** (–a, –b)   **c)** (–b, a)
d) (b, –a)   **e)** (b, –a)   **f)** (–b, a)

Practice 5.1 (*cont'd*)

12. a) 1) In the 2nd quadrant.   **2)** $\dfrac{3\pi}{4}$ rad

   b) 1) On the *y*-axis, between the 3rd and 4th quadrant.   **2)** $\dfrac{3\pi}{2}$ rad

   c) 1) In the 2nd quadrant.   **2)** $\dfrac{2\pi}{3}$ rad

   d) 1) On the *y*-axis, between the 3rd and 4th quadrant.   **2)** $\dfrac{3\pi}{2}$ rad

   e) 1) In the 1st quadrant.   **2)** $\dfrac{\pi}{6}$ rad

   f) 1) In the 4th quadrant.   **2)** $\dfrac{5\pi}{3}$ rad

13. a) $\pm\dfrac{1}{2}$ **b)** $\pm\dfrac{\sqrt{3}}{2}$ **c)** ± 1 **d)** $\pm\dfrac{4}{5}$ **e)** $\pm\dfrac{\sqrt{11}}{6}$ **f)** $\pm\dfrac{\sqrt{5}}{3}$

14. $\tan\dfrac{3\pi}{2} = \dfrac{\sin\frac{3\pi}{2}}{\cos\frac{3\pi}{2}} = \dfrac{1}{0}$, which does not exist in the set of real numbers.

15. Ⓐ Ⓕ, Ⓑ Ⓒ, Ⓓ Ⓖ, Ⓔ Ⓗ

16. a) The length of this hedge is approximately 33.16 m.

   b) $\dfrac{33.16}{0.3} \approx 110.53$ cedars can be planted, which is a maximum of 110 cedars.

   $110 \times \$4.50 = \$495$
   The landscaping of this hedge costs $495.

Practice 5.1 (*cont'd*)

17. a) The period of this function is 10.   **b) 1)** 1   **2)** 1   **3)** 2

18. a) The mean radius of the ISS orbit is 6718 km.
   b) 1) The ISS moves at approximately 0.0012 rad/s.   **2)** The ISS moves at approximately 7730.85 m/s.
   3) The ISS moves at approximately 27 831.06 km/h.

19. The rotational velocity of Drum **B** is 4.8 rad/s.

Practice 5.1 (*cont'd*)

20. m $\overline{AB}$ = 639.163 km = m $\overline{EB}$
   m $\overline{BC}$ = 218.127 km = m $\overline{BD}$
   m $\overarc{CD}$ = 543.056 km
   The space probe has therefore covered a distance of approximately 2257.64 km.

21. a) The length of the arc is 26.25 cm.   **b)** The length of the arc is 70 cm.
   c) The length of the arc is 105 cm.

22. The minimum radius of the torus is 245.25 m.