Exercises 1.1

1. In which quadrant does the given point lie?

a. $\frac{3\pi}{4}$ b. $-\frac{9\pi}{7}$ c. $\frac{11\pi}{3}$ d. $\frac{7\pi}{6}$

e. $-\frac{7\pi}{4}$ f. $-\frac{7\pi}{6}$ g. $-\frac{\pi}{3}$ h. $\frac{13\pi}{6}$

2. Give four other real numbers which correspond to the same point on the unit circle as the given number.

a. $\frac{\pi}{3}$ b. $\frac{\pi}{6}$ c. $\frac{3\pi}{4}$ d. $\frac{4\pi}{3}$ e. $\frac{5\pi}{6}$ f. $\frac{\pi}{4}$

Name a point which is symmetric to the given point with respect to (a) the u-axis; (b) the v-axis; (c) the origin.

3. $\frac{\pi}{6}$ 4. $\frac{\pi}{3}$ 5. $\frac{3\pi}{4}$ 6. $\frac{5\pi}{8}$

7. $\frac{3\pi}{7}$ 8. $\frac{5\pi}{9}$ 9. $\frac{\pi}{12}$ 10. $\frac{\pi}{10}$

Exercises 1.2

1. a. If x has coordinates (u, v), what coordinates does $-x$ have?
   b. $\cos x = u$. What is $\cos(-x)$?
   c. $\sin x = v$. What is $\sin(-x)$?

2. Find the following function values.

a. $\cos\left[-\frac{\pi}{3}\right]$ b. $\cos\left[-\frac{\pi}{4}\right]$ c. $\cos\left[-\frac{\pi}{6}\right]$

d. $\sin\left[-\frac{\pi}{3}\right]$ e. $\sin\left[-\frac{\pi}{4}\right]$ f. $\sin\left[-\frac{\pi}{6}\right]$

3. a. If x has coordinates (u, v), what coordinates does $x + \pi$ have?
   b. What is $\cos(x + \pi)$?
   c. What is $\sin(x + \pi)$?

4. Find the following function values.

a. $\cos\frac{7\pi}{6}$ b. $\cos\frac{5\pi}{4}$ c. $\cos\frac{4\pi}{3}$

d. $\sin\frac{7\pi}{6}$ e. $\sin\frac{5\pi}{4}$ f. $\sin\frac{4\pi}{3}$

5. a. If x has coordinates (u, v), what coordinates does $\pi - x$ have?
   b. What is $\cos(\pi - x)$?
   c. What is $\sin(\pi - x)$?

6. Find the following function values.

a. $\cos\frac{3\pi}{4}$ b. $\cos\frac{2\pi}{3}$ c. $\cos\frac{5\pi}{6}$

d. $\sin\frac{3\pi}{4}$ e. $\sin\frac{2\pi}{3}$ f. $\sin\frac{5\pi}{6}$

7. If x has coordinates (u, v), what coordinates does $x \pm 2\pi$ have?

   a. What is $\cos(x + 2\pi)$?
   b. What is $\sin(x + 2\pi)$?
   c. What is $\cos(x - 2\pi)$?
   d. What is $\sin(x - 2\pi)$?

8. Use the results of exercises 1–7 to find the following function values.

   a. $\cos\left[\frac{7\pi}{4}\right]$
   b. $\cos\left[-\frac{7\pi}{6}\right]$
   c. $\cos\left[\frac{10\pi}{3}\right]$
   d. $\sin\left[-\frac{5\pi}{4}\right]$
   e. $\sin\left[\frac{11\pi}{6}\right]$
   f. $\sin\left[-\frac{4\pi}{3}\right]$
   g. $\sin\left[-\frac{5\pi}{6}\right]$
   h. $\sin\left[\frac{8\pi}{3}\right]$
   i. $\sin\left[-\frac{9\pi}{4}\right]$
   j. $\cos\left[\frac{5\pi}{6}\right]$
   k. $\cos\left[-\frac{11\pi}{6}\right]$
   l. $\cos\left[\frac{13\pi}{4}\right]$

9. x is in the second quadrant, $\cos x = -\frac{15}{17}$. Find $\sin x$.

10. x is in the fourth quadrant, $\cos x = \frac{3}{5}$. Find $\sin x$.

11. x is in the fourth quadrant, $\sin x = -\frac{1}{3}$. Find $\cos x$.

12. x is in the second quadrant, $\sin x = \frac{\sqrt{5}}{5}$. Find $\cos x$.

13. z is in the first quadrant, $\sin z = \frac{8}{17}$. Find $\cos z$.

14. z is in the third quadrant, $\sin z = -\frac{3}{4}$. Find $\cos z$.

15. y is in the third quadrant, $\cos y = -\frac{2}{5}$. Find $\sin y$.

16. t is in the first quadrant, $\cos t = \frac{5}{13}$. Find $\sin t$.

17. w is in the fourth quadrant, $\sin w = -\frac{2}{3}$. Find $\cos w$.

18. θ is in the second quadrant, $\cos \theta = -\frac{2}{7}$. Find $\sin \theta$.