CHAPTER 7 REVIEW EXERCISES

Section 7.1

Convert each of the following angle measures as directed.

1. Express $\frac{\pi}{45}$ in degrees.

2. Express $\frac{6\pi}{5}$ in degrees.

3. Express $-\frac{7\pi}{4}$ in degrees.

4. Express $-\frac{3\pi}{10}$ in degrees.

5. Express 42° in radians.

6. Express 60° in radians.

7. Express –79° in radians.

8. Express –25° in radians.

Sketch the indicated angles.

9. 300°

10. $-\frac{9\pi}{4}$

Find the length of the arc subtended by the given central angle θ on a circle of radius r. Round your answers to two decimal places.

11. $r = 5$ ft; $\theta = 180^{\circ}$

12. $r = 8$ km; $\theta = \frac{3\pi}{4}$

Find the indicated arc length in each of the following problems. Round your answers to two decimal places.

13. Given a circle of radius 16.3 meters, find the length of the arc subtended by a central angle of $\frac{3\pi}{5}$.

14. Given a circle of radius 8 inches, find the length of the arc subtended by a central angle of 72° (**Hint:** Convert to radians first).

15. Find the distance between Vancouver, British Columbia and San Francisco, California which have the same longitude. The latitude of Vancouver is 49.25° N and the latitude of San Francisco is 37.77° N. Assume the Earth's radius is 6470 km.

Find the radian measure of the central angle θ given the radius r and the length s of the arc subtended by θ. Leave your answers in fraction form.

16. $r = 18$ ft; $s = 52$ ft

17. $r = 6.4$ dm; $s = 19.2$ dm

Solve the following problems. Round your answers to two decimal places.

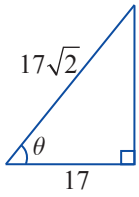
18. A gear in a machine has a radius of 14 cm and is rotating at a constant speed of 600 rpm. Find **a.** the angular speed of a tooth of the gear in radians per minute and **b.** the linear speed of the tooth in meters per second.

19. Find the area of the sector of a circle of radius 18 ft with a central angle of $\frac{2\pi}{3}$.

Section 7.2

Use the information contained in each figure to determine the values of the six trigonometric functions of θ. Rationalize all denominators in your answers.

20.



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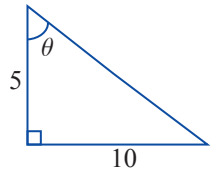

Use a calculator to evaluate each of the following expressions. Round your answers to four decimal places.

22. $\sin 82°$

23. $\cot 14°$

24. $\csc\left(\frac{5\pi}{12}\right)$

25. $\cos\left(\frac{3\pi}{7}\right)$

Convert each expression from degrees, minutes, seconds (DMS) notation to decimal notation. Round your answers to four decimal places.

26. $36°56'14''$

27. $15°12'73''$

Determine whether the following statements are true or false. Use a calculator when necessary.

28. If $\tan\theta = 1.6$, then $\cot\theta = 0.625$.

29. If $\csc\theta = 3.4$, then $\sin\theta = 1.7$.

Use an appropriate trigonometric function and a calculator if necessary to solve each of the following problems. Round your answer to two decimal places.

30. A wheelchair ramp touches the ground 15 feet away from the top of the steps. If the ramp makes an angle of 30° relative to the ground, how long is the ramp?

31. A building is 83 feet tall and a cable is stretched from the top of the building to the ground. If the angle between the cable and the ground is 40°, how long is the cable?

Section 7.3

Determine the values of the six trigonometric functions of each angle θ, using a calculator and rounding your answers to four decimal places if necessary.

32. $\theta = 90^{\circ}$

33. $\theta = -460^{\circ}$

34. $\theta = \frac{\pi}{4}$

35. $\theta = \frac{7\pi}{3}$

Determine the reference angle associated with the given angle.

36. $\theta = 86^{\circ}$

37. $\theta = -143^{\circ}$

38. $\theta = \frac{3\pi}{2}$

39. $\theta = \frac{11\pi}{4}$

Determine the quadrant in which the terminal side of the angle θ is located.

40. $\csc\theta > 0$ and $\tan\theta > 0$

41. $\sec\theta < 0$ and $\cot\theta > 0$

In Exercises 42 and 43, **a.** rewrite the expression in terms of the given angle's reference angle, and then **b.** evaluate the result, using a calculator and rounding your answer to four decimal places if necessary.

42. $\sin 290°$

43. $\tan\left(\frac{4\pi}{3}\right)$

Express each of the following in terms of the appropriate cofunction, and verify the equivalence of the two expressions, using a calculator and rounding your answer to four decimal places if necessary.

44. $\csc 193°$

45. $\sin(-42°)$

46. $\cot\left(\frac{3\pi}{4}\right)$

47. $\cos\left(\frac{5\pi}{4}\right)$

Use the given information about each angle to evaluate the expression, if possible. If no angle with the stated properties exists, determine the reason.

48. Given that $\sin\theta = \frac{\sqrt{2}}{2}$ and $\tan\theta$ is negative, determine θ and $\tan\theta$.

49. Given that $\csc\theta = \frac{13}{12}$ and θ lies in the first quadrant, determine $\sec\theta$.

Section 7.4

Determine the amplitude, period, and phase shift of each of the following functions.

50. $f(x) = 3\cos(4x)$

51. $h(x) = 10 + 6\cos x$

52. $g(x) = 6 - \frac{1}{2}\sin(3\theta - \pi)$

53. $f(x) = -3 + 9\sin(2\theta + 2\pi)$

Sketch the graph of each of the following functions.

54. $f(x) = \frac{1}{2}\cos(3\pi x)$

55. $g(x) = 4\sin(2x - 5)$

56. $f(\theta) = 5\cos\left(\theta - \frac{\pi}{3}\right)$

57. $h(x) = 2 + \sin(x - \pi)$

58. $g(x) = 1 - \frac{1}{2}\sin\left(\frac{1}{2}x + \frac{\pi}{4}\right)$

59. $f(t) = \frac{1}{2}e^{-t}\cos(t + 2\pi) - 1$

Section 7.5

Sketch the graph of each of the following functions.

60. $f(x) = 1 - \tan\left(x - \frac{\pi}{2}\right)$

61. $f(x) = \cot\left(\frac{\pi x}{4} + \frac{\pi}{4}\right)$

62. $f(x) = \frac{1}{2}\sec(2\pi x)$

63. $f(x) = -3\csc\left(\frac{x}{2} + \frac{\pi}{2}\right) + 1$

Section 7.6

Evaluate each of the following expressions without the use of a calculator.

64. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

65. $\cos^{-1} 0$

66. $\arctan(-1)$

67. $\csc^{-1}\left(\frac{2\sqrt{3}}{3}\right)$

Evaluate each of the following expressions, if possible, using a calculator and rounding your answer to four decimal places if necessary.

68. $\sin^{-1} 2$

69. $\tan^{-1}(0.5)$

Evaluate each of the following expressions, if possible.

70. $\arccos(\sin \pi)$

71. $\cos\left(\cos^{-1}(0.9)\right)$

72. $\tan\left(\tan^{-1}(0.75)\right)$

73. $\sin^{-1}\left(\cos\left(\frac{3\pi}{4}\right)\right)$

Find the value of each of the following expressions without using a calculator.

74. $\sin\left(\arctan\left(\frac{\sqrt{3}}{3}\right)\right)$

75. $\cot\left(\sec^{-1} 2\right)$

76. $\cos\left(\arcsin\left(\frac{-\sqrt{2}}{2}\right)\right)$

77. $\sec\left(\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)$

Using a calculator, find the value of θ in radians. Remember to make sure your calculator is in the correct mode.

78. $\theta = \cos^{-1}(0.3492581)$

79. $\theta = \tan^{-1}(-4.18249588)$

Using a calculator, find the value of θ in degrees. Remember to make sure your calculator is in the correct mode.

80. $\theta = \arcsin(-0.66666667)$

81. $\theta = \arccos(0.56894372)$

Express the following function as a purely algebraic function.

82. $\tan\left(\sin^{-1}\left(\frac{x}{\sqrt{x^2 + 4}}\right)\right)$