Use the triangle below to find the exact value of each of the trigonometric functions in questions 1 – 6. Make sure your answers are completely simplified/rationalized.

1. $\sin \theta$
2. $\cos \theta$
3. $\tan \theta$
4. $\csc \theta$
5. $\sec \theta$
6. $\cot \theta$

7. Find the missing angle:

8. Find the exact value of $a$ and $b$ in the triangle. Your final answers should not be in decimal form.

9. Find the exact value of the hypotenuse in the triangle. Your final answer should not be in decimal form. Then give the value of $\theta$ in the triangle.

10. Find the exact value of $m$ and $n$ in the triangle. Your final answers should not be in decimal form.
11. Find the missing side\(x\) in the triangle below. Round your answer to the nearest tenth if necessary.

\[
\begin{array}{c}
\text{B} \\
44^\circ \\
\text{x} \\
\text{C}
\end{array}
\]

12. Convert 675° to radians. Leave your answer in terms of \(\pi\).

13. Convert \(\frac{21\pi}{4}\) to degrees.

14. Give an example of one positive and one negative angle that is coterminal with 110°.

15. Let \((-2, \sqrt{5})\) be a point on the terminal side of angle \(\theta\) in standard position. Find the exact value of the 6 trigonometric functions of \(\theta\).

16. Let \((0, -11)\) be a point on the terminal side of angle \(\theta\) in standard position. Find the exact value of the 6 trigonometric functions of \(\theta\).

17. In what quadrant does \(\theta\) lie if \(\sec \theta < 0\) and \(\tan \theta > 0\)?

18. Suppose \(\sec \theta = -\frac{5}{4}\) and \(\theta\) lies in Quadrant II, find the exact value of the 5 remaining trigonometric functions of \(\theta\).

19. Suppose \(\tan \theta = \sqrt{5}\) and 180° < \(\theta\) < 270°. Find the exact value of the 5 remaining trigonometric functions of \(\theta\).

20. Find the reference angle of: a) 280° b) 45° c) 130° d) 350°

21. What is the reference angle of \((-\frac{13\pi}{3})\)?
Find the exact value of each of the following.

22. \( \tan 750^\circ \)
23. \( \cot \pi \)
24. \( \sec (-900^\circ) \)
25. \( \tan 225^\circ \)
26. \( \cos (-210^\circ) \)
27. \( \cos \left( -\frac{11\pi}{4} \right) \)
28. \( \csc (-450^\circ) \)
29. \( \cot (-300^\circ) \)
30. \( \csc 720^\circ \)
31. \( \cot \left( \frac{13\pi}{6} \right) \)
32. \( \cos \left( -\frac{14\pi}{3} \right) \)

33. If \( \sec \theta = -3 \), and \( \theta \) is in quadrant II, find:

a) \( \cos \theta \) 
 b) \( \cos(-\theta) \) 
 c) \( \sec(-\theta) \) 
 d) \( \sin \theta \) 
 e) \( \sin(-\theta) \) 
 f) \( \tan \theta \) 
 g) \( \tan(-\theta) \) 
 h) \( \cot \theta \) 
 i) \( \cot(-\theta) \) 
 j) \( \sin 2\theta \) 
 k) \( \cos 2\theta \) 
 l) \( \tan 2\theta \) 
 m) \( \cot 2\theta \) 
 n) \( \csc 2\theta \) 
 o) \( \sec 2\theta \) 

34. If \( \cos \theta = -\frac{1}{4} \) and \( \tan \theta > 0 \), find:

a) \( \sec \theta \) 
 b) \( \sec(-\theta) \) 
 c) \( \cot(\theta) \) 
 d) \( \csc \theta \) 
 e) \( \sin(-\theta) \)
35. If \( \sin \theta = 0.87 \), what is \( \cos \left( \frac{\pi}{2} - \theta \right) \)? What is \( \cos \left( \theta - \frac{\pi}{2} \right) \)?

36. If \( \cot \theta = -1.43 \), what is \( \tan \left( \frac{\pi}{2} - \theta \right) \)? What is \( \tan \left( \theta - \frac{\pi}{2} \right) \)?

37. If \( \sin \theta < 0 \) and \( \tan \theta < 0 \), in what quadrant does \( \theta \) lie?

38. If \( \cos A = \frac{3}{5} \) and \( A \) is in quadrant IV and \( \sin B = -\frac{5}{13} \) and \( B \) is in quadrant III, find the exact value of each of the following:
   
   a) \( \cos \frac{A}{2} \)  
   b) \( \sin \frac{A}{2} \)  
   c) \( \tan \frac{B}{2} \)  
   d) \( \tan(A + B) \)  
   e) \( \tan(A - B) \)  
   f) \( \sin(B - A) \)  
   g) \( \sin 2A \)  
   h) \( \tan 2B \)  
   i) \( \sec \frac{A}{2} \)  
   j) \( \csc \frac{B}{2} \)  
   k) \( \cot \frac{B}{2} \)

39. Find the exact value of \( \cos 15^\circ \cos 30^\circ - \sin 15^\circ \sin 30^\circ \)

40. Find the exact value of \( \frac{\tan 200^\circ + \tan 10^\circ}{1 - \tan 200^\circ \tan 10^\circ} \)

41. Find the exact value of \( \cos 165^\circ \).

42. Find the exact value of \( \sin \frac{5\pi}{8} \).

43. Show that \( \frac{1 - \tan^2 x}{2 \tan^2 x + 4 \tan x + 3} = \frac{1 - \tan x}{2 \tan x + 3} \).

44. Show that \( \frac{1 + \sin x \cos x}{\cos x} = \sec x + \sin x \)

45. Show that \( 1 - \cos^2 x \tan^2 x = \cos^2 x \)

46. Show that \( \sin x - \csc x = -\cot x \cos x \)

47. Show that \( \frac{1 + \sin^2 x}{1 - \sin^2 x} = \frac{\sin^2 x - \sin x + 1}{1 - \sin x} \)

48. Show that \( \cos x + \tan x \sin x = \sec x \)

49. Show that \( \frac{\tan^2 x + 1}{\sec^2 x - 1} = \sec^2 x \tan^2 x \)
50. Two angles that have the same initial side and terminal side but have different measures are called ______________ angles.

51. The __________ function and cosine function are reciprocals.

52. Since the sine function is odd, \( \sin(-\theta) = \) ______________.

53. What is the radius of the unit circle?

54. Sine cosecant and secant are __________, \( \csc \theta = \sec(90° - \theta) \).

55. Approximately how many radians are there in a circle?

56. Exactly how many radians are there in a circle?
57. \( 180° = \) _______(exactly) radians

58. Approximately how many degrees are there in one radian?

59. Factor: \( x^2 - 13x + 42 \)

60. Factor: \( -3x^3 + 3x^2 + 18x \)

61. Factor: \( 6x^4 - 60x^3 + 54x^2 \)

62. Factor: \( 5x^2 - 42x + 49 \)

63. Factor: \( 8x^2 - 77x + 45 \)

64. Factor: \( -10x^2 - 27x - 18 \)

65. Factor: \( x^3 - 64 \)

66. Factor: \( 27x^3 + 8 \)

67. Factor: \( 9x^2 - 49 \)

68. Factor: \( 7x^2 + 11x - 6 \)

69. Factor: \( 12x^2 - 16x - 3 \)

70. \( 6x^2 + 34x - 56 \)