

1. For what value of x is the following expression undefined?

$$\frac{\sin x}{1 + \cos x}, \text{ where } 0 \leq x < 2\pi$$

- A. 0
B. $\frac{\pi}{2}$
C. π
D. $\frac{3\pi}{2}$

2. Simplify: $\frac{\sqrt{\sec^2 x - 1}}{\sqrt{\csc^2 x - 1}}$

- A. $\tan^2 x$
B. $\cot^2 x$
C. $\tan^4 x$
D. $\cot^4 x$

3. Which expression is equivalent to $\csc \theta \cot \theta \sec \theta \sin \theta$?

- A. $\sec \theta$
B. $\csc \theta$
C. $\frac{\sin \theta}{\cos^2 \theta}$
D. $\frac{\cos \theta}{\sin^2 \theta}$

4. Which expression is equivalent to $\csc^2 \theta - 1$?

- A. $\tan^2 \theta$
B. $\csc^2 \theta \sin^2 \theta$
C. $\cot^2 \theta - 1$
D. $\csc^2 \theta \cos^2 \theta$

5. Which expression is equivalent to $\frac{\cot \theta - 1}{1 - \tan \theta}$?

- A. $\cot \theta$
B. $\tan \theta$
C. $-\cot \theta$
D. $-\tan \theta$

6. Simplify: $\frac{\sec \theta - \cos \theta}{\csc \theta - \sin \theta}$

- A. $\tan^3 \theta$
B. $\tan^2 \theta$
C. $\cot \theta$
D. $\tan \theta - \cot \theta$

7. Which expression is equivalent to $\cot \theta + \tan \theta$?

- A. $\frac{1}{\sin \theta \cos \theta}$
B. $\frac{\cos \theta + \sin \theta}{\sin \theta \cos \theta}$
C. 1
D. 2

8. Simplify: $\cot^2 \theta \sin^2 \theta + \cos^2 \theta$

- A. $\cos^4 \theta$
B. $2 \cos^2 \theta$
C. $\sin^4 \theta$
D. $\cot^2 \theta$

9. Simplify: $\frac{\sec \theta}{\tan \theta + \cot \theta}$

- A. $\cos \theta$
B. $\sin \theta$
C. $\sec \theta$
D. $\csc \theta$

10. Determine an expression for x such that $\frac{2 - \cos^2 \theta}{\sin \theta} = x + \sin \theta$ is an identity.

- A. $\csc \theta$
B. $\sec \theta$
C. $\cos \theta$
D. $\cos^2 \theta$

11. Determine all restrictions for $\frac{\cot \theta}{1 - \sin \theta}$.

- A. $\sin \theta \neq 1$
B. $\sin \theta \neq 0$
C. $\sin \theta \neq 1, \cos \theta \neq 0$
D. $\sin \theta \neq 0, \sin \theta \neq 1$

12. Given $\csc^2 \theta + \sin^2 \theta = 5.34$, find the value of $\frac{1}{\csc^2 \theta} + \frac{1}{\sin^2 \theta}$.

- A. 0.19
B. 2.27
C. 5.14
D. 5.34

13. State the restriction(s) for $\cot x$.

- A. $\sin x \neq 0$
- B. $\cos x \neq 0$
- C. $\cos x \neq 0, \sin x \neq 0$
- D. no restriction(s)

14. Determine **all** values of x for which the following expression is undefined.

$$\frac{\sin x}{1 - \sec^2 x}, \text{ where } 0 \leq x < 2\pi$$

- A. $\frac{\pi}{2}, \frac{3\pi}{2}$
- B. $0, \pi$
- C. $0, \frac{\pi}{2}$
- D. $0, \pi, \frac{\pi}{2}, \frac{3\pi}{2}$

15. Which expression is equivalent to $\frac{\sin \theta + \cos \theta \cot \theta}{\cot \theta}$?

- A. $\csc \theta$
- B. $\cos \theta$
- C. $\sin \theta$
- D. $\sec \theta$

16. Simplify: $\frac{\cot \theta}{\sec \theta} + \sin \theta$

- A. 1
- B. $\csc \theta$
- C. $\cos^2 \theta$
- D. $2 \sin \theta$

17. Determine all restrictions for the expression:

$$\frac{\sec x}{4 \sin^2 x - 1}$$

- A. $\sin x \neq \pm \frac{1}{4}$
- B. $\sin x \neq \pm \frac{1}{2}$
- C. $\cos x \neq 0, \sin x \neq \pm \frac{1}{4}$
- D. $\cos x \neq 0, \sin x \neq \pm \frac{1}{2}$

18. Determine all restrictions for the expression $\sin \theta \cot \theta$.

- A. $\cos \theta \neq 0$
- B. $\sin \theta \neq 0$
- C. $\cos \theta \neq 0, \sin \theta \neq 0$
- D. no restrictions

19. Which expression is equivalent to $\frac{\cos x}{\sec x} - \cos x \sec x$?

- A. $\cos^2 x$
- B. $-\cos^2 x$
- C. $\sin^2 x$
- D. $-\sin^2 x$

20. Which expression is equivalent to $\frac{\cot \theta \sin \theta}{\sec \theta}$?

- A. $\sin^2 \theta$
- B. $\cos^2 \theta$
- C. $\sec^2 \theta$
- D. $\csc^2 \theta$

21. State all restrictions for $\frac{\csc \theta - 1}{\csc \theta + 1}$.

- A. $\sin \theta \neq 0$
- B. $\sin \theta \neq -1$
- C. $\sin \theta \neq 0, \sin \theta \neq -1$
- D. $\sin \theta \neq 0, \sin \theta \neq \pm 1$

22. Simplify: $\frac{\cos x}{\cos x - \cos^3 x}$

- A. $\csc^2 x$
- B. $\sec^2 x$
- C. $\tan^2 x$
- D. $-\sec^3 x$

23. Simplify: $\cos\left(\frac{3\pi}{2} + \theta\right)$

- A. $\sin \theta$
- B. $-\sin \theta$
- C. $\cos \theta$
- D. $-\cos \theta$

24. Simplify: $\cos(630^\circ - \theta)$

- A. $-\cos \theta$
- B. $-\sin \theta$
- C. $\cos \theta$
- D. $\sin \theta$

25. If the point $(1, 2)$ lies on the terminal arm of angle θ in standard position, determine the value of $\cos(\pi + \theta)$.

- A. $\frac{-2}{\sqrt{5}}$
- B. $\frac{-1}{\sqrt{5}}$
- C. $\frac{1}{\sqrt{5}}$
- D. $\frac{2}{\sqrt{5}}$

26. Given that $\sin \theta = \frac{4}{5}$, where $90^\circ < \theta < 180^\circ$, evaluate $\sin(\theta - 270^\circ)$.

- A. $-\frac{4}{5}$
- B. $-\frac{3}{5}$
- C. $\frac{3}{5}$
- D. $\frac{4}{5}$

27. Simplify: $\cos(\pi + \theta) + \cos(\pi - \theta)$

- A. -2
- B. 1
- C. $2 \cos \theta$
- D. $-2 \cos \theta$

28. If $\sin \theta = a$ and $0 < \theta < \frac{\pi}{2}$, determine an expression for $\cos(\pi + \theta)$.

- A. $1 - a$
- B. $a - 1$
- C. $\sqrt{1 - a^2}$
- D. $-\sqrt{1 - a^2}$

29. How many solutions does $\cos 2x \cos x - \sin 2x \sin x = 0$ have over the interval $0 \leq x < 2\pi$?

- A. 2
- B. 3
- C. 4
- D. 6

30. Which of the following is equivalent to $\cos 5\theta \cos \theta - \sin 5\theta \sin \theta$?

- A. $\cos 4\theta$
- B. $\cos 6\theta$
- C. $\cos 4\theta - \sin 4\theta$
- D. $\cos 6\theta - \sin 6\theta$

31. Let A be an angle in standard position such that $0 < A < \frac{\pi}{2}$. If $\sin A = n$ and $\cos A = m$, determine an expression for $\sin(\pi + A) + \cos(\pi + A)$.

- A. $-m - n$
- B. $-m + n$
- C. $m - n$
- D. $m + n$

32. Simplify: $\cos A \cos B - \sin A \sin B$ where $A = \frac{\pi}{2} - B$

- A. 0
- B. 1

33. Simplify: $\sin 5m \cos m + \cos 5m \sin m$

- A. $\cos 4m$
- B. $\cos 6m$
- C. $\sin 4m$
- D. $\sin 6m$

- C. $\cos\left(\frac{\pi}{2} - 2B\right)$
- D. $\cos\left(\frac{\pi}{2} + 2B\right)$

34. Determine $\tan \theta$ if $\cos(\pi + \theta) = \sin \theta$.

- A. -1
- B. 0
- C. 1
- D. undefined

35. Simplify $\sin A \cos B + \cos A \sin B$ if $A = \frac{\pi}{2} - B$.

- A. -1
- B. 0
- C. 1
- D. $\frac{\pi}{2}$

36. If $\cot \theta = -\frac{12}{5}$, $\frac{\pi}{2} < \theta < \pi$, determine the value of $\sin(\theta + \pi)$.

- A. $-\frac{5}{12}$
- B. $-\frac{5}{13}$
- C. $\frac{5}{13}$
- D. $\frac{5}{12}$

37. Which of the following is equivalent to $\cos(2\theta + \pi)$?

- A. $2 \sin \theta \cos \theta$
- B. $-2 \sin \theta \cos \theta$
- C. $1 - 2 \sin^2 \theta$
- D. $2 \sin^2 \theta - 1$

38. Simplify: $\cos 7x \cos 5x - \sin 7x \sin 5x$

- A. $\cos 2x$
- B. $\sin 2x$
- C. $\cos 12x$
- D. $\sin 12x$

39. Which expression is equivalent to $(\sin^2 \theta - \cos^2 \theta)^2 - \sin^2 2\theta$?

- A. $-2 \sin^2 2\theta$
- B. $2 \sin^2 2\theta$
- C. $-\cos 4\theta$
- D. $\cos 4\theta$

40. Simplify: $\sin^2 x - \cos^2 x$

- A. $-\cos 2x$
- B. $\cos 2x$
- C. -1
- D. 1

41. Which expression is equivalent to $\frac{2 \tan \theta \cot 2\theta}{1 + \tan \theta}$?

- A. $1 - \tan \theta$
- B. $\frac{1}{1 - \tan \theta}$
- C. $\frac{1}{1 + \tan \theta}$
- D. $\frac{1}{\tan \theta}$

42. Determine all restrictions for $\csc 2\theta$.

- A. $\sin \theta \neq 0$
- B. $\cos \theta \neq 0$
- C. $\sin \theta \neq 0, \cos \theta \neq 0$
- D. no restrictions

43. Simplify: $\frac{\csc^2 \theta - 2}{\csc^2 \theta}$

- A. $-2 \sin^2 \theta$
- B. $2 \sin^2 \theta$
- C. $-\cos 2\theta$
- D. $\cos 2\theta$

44. Simplify: $\cos^4 \theta - \sin^4 \theta$

- A. -1
- B. $-\cos 2\theta$
- C. $\cos 2\theta$
- D. $\cos 4\theta$

45. Which expression is equivalent to $\frac{1 - \cos 2\theta}{2}$?

- A. $-\sin^2 \theta$
- B. $-\cos^2 \theta$
- C. $\sin^2 \theta$
- D. $\cos^2 \theta$

46. Write $2 \cos^2 4x - 2 \sin^2 4x$ in terms of a single trigonometric function.

- A. $\cos 2x$
- B. $2 \cos 2x$
- C. $\cos 8x$
- D. $2 \cos 8x$

47. Which expression is equivalent to $\frac{1 - \cos 2\theta}{\sin 2\theta}$?

- A. $\tan \theta$
- B. $\cot \theta$
- C. $-\tan \theta$
- D. $-\cot \theta$

48. Simplify: $\frac{2 \tan x}{\cos^2 x + \sin^2 x + \tan^2 x}$

- A. $2 \sin x$
- B. $\sin 2x$
- C. $\tan 2x$
- D. $2 \cot x$

49. Which expression is equivalent to $4 \sin 6\theta \cos 6\theta$? 50. Which expression is equivalent to $\sin x \cos x$?

- A. $\sin 6\theta$
- B. $\sin 12\theta$
- C. $2 \sin 3\theta$
- D. $2 \sin 12\theta$

- A. $\frac{1}{2} \sin 2x$
- B. $2 \sin 2x$
- C. $2 \sin x$
- D. $\frac{1}{2} \sin x$

51. Simplify: $2 \cot x \sin^2 x$

- A. $\frac{\sin 2x}{2}$
- B. $\sin 2x$
- C. $\frac{2 \sin^3 x}{\cos x}$
- D. $\cos 2x \sin x$

52. Which expression is equivalent to $\frac{\cos 2\theta - 1}{\sin 2\theta}$?

- A. $\cot \theta$
- B. $\tan \theta$
- C. $-\cot \theta$
- D. $-\tan \theta$

53. Simplify: $\frac{1 - \sin^2 \theta}{\sin 2\theta}$

- A. $\frac{1}{2} \cot \theta$
- B. $2 \cot \theta$
- C. $\frac{1}{2} \tan \theta$
- D. $2 \tan \theta$

54. Simplify: $\frac{\cos 2\theta - 1}{2 \sin \theta}$

- A. $-\sin \theta$
- B. $\sin \theta$
- C. $\cot \theta - 1$
- D. $\frac{\cos^2 \theta}{\sin \theta}$

55. Express $\sin 4x \cos 4x$ as a single trigonometric function.

- A. $\frac{1}{2} \sin 8x$
- B. $\frac{1}{2} \sin 2x$
- C. $2 \sin 8x$
- D. $2 \sin 2x$

56. Determine the value of $\sin 2\theta$, if $\cos \theta = -\frac{12}{13}$ and $\pi < \theta < \frac{3\pi}{2}$.

- A. $-\frac{10}{13}$
- B. $\frac{25}{169}$
- C. $-\frac{120}{169}$
- D. $\frac{120}{169}$

57. Simplify: $\frac{\sin 2x}{1 - \cos 2x}$

- A. $\cot x$
- B. $\tan x$
- C. $2 \cot x$
- D. $2 \tan x$

58. Simplify: $18 \sin 3x \cos 3x$

- A. $6 \sin 3x$
- B. $6 \sin 9x$
- C. $9 \sin 6x$
- D. $18 \sin 6x$

59. If $(\sin \theta + \cos \theta)^2 = a$, find the value of $\sin 2\theta$.

- A. $2a - 2$
- B. $2a + 2$
- C. $a - 1$
- D. $a + 1$

60. Determine an expression equivalent to $\frac{\sec^2 \theta}{\sec^2 \theta - 2}$.

- A. $-\csc 2\theta$
- B. $-\sec 2\theta$
- C. $\csc 2\theta$
- D. $\sec 2\theta$

61. Which expression is equivalent to $4 \sin^2 2x - 2$?

- A. $-2 \cos 2x$
- B. $-2 \cos 4x$
- C. $-\cos 2x$
- D. $-\cos 4x$

62. Simplify: $\frac{3 - 6 \sin^2 x}{2 \sin x \cos x}$

- A. $3 \cot 2x$
- B. $3 \tan 2x$
- C. $-\frac{3}{2} \tan x$
- D. $\frac{3}{2} \cot x$

KEY

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|-------|-------|-------|-------|-------|
| 1. C | 14. D | 27. D | 40. A | 52. D |
| 2. A | 15. D | 28. D | 41. A | 53. A |
| 3. B | 16. B | 29. D | 42. C | 54. A |
| 4. D | 17. D | 30. B | 43. D | 55. A |
| 5. A | 18. B | 31. A | 44. C | 56. D |
| 6. A | 19. D | 32. A | 45. C | 57. A |
| 7. A | 20. B | 33. D | 46. D | 58. C |
| 8. B | 21. C | 34. A | 47. A | 59. C |
| 9. B | 22. A | 35. C | 48. B | 60. B |
| 10. A | 23. A | 36. B | 49. D | 61. B |
| 11. D | 24. B | 37. D | 50. A | 62. A |
| 12. D | 25. B | 38. C | 51. B | |
| 13. A | 26. B | 39. D | | |