3.6 Problems in the book

EXERCISES 3-6

Solve each equation for $0° \le \theta < 360°$.

A

1. $\sin\theta = -\cos\theta$
2. $2\sqrt{3}\cos\theta - 6\sin\theta = 0$
3. $\sin\theta + 2\cos\theta = 0$
4. $4\sec\theta - \csc\theta = 0$
5. $4\sin^2\theta - 3 = 0$
6. $2\sin\theta = \csc\theta$
7. $1 - 3\cos\theta = \sin^2\theta$
8. $\tan^2\theta = 2\sec\theta - 1$
9. $\cot^2\theta = 3(\csc\theta - 1)$
10. $2\cos^2\theta + \sin\theta = 1$
11. $\tan\theta = 2\sin\theta$
12. $\sqrt{2}\sin\theta = \cot\theta$

Solve each equation for $0 \le x < 2\pi$.

13. $\cos 2x = \sin x$
14. $\cos 2x = -\cos x$
15. $\sin 2x = -\sin x$
16. $\sin 2x = \cos x$
17. $\sin 2x = -\cos 2x$
18. $2\sin^2 2x = 1$

Give the general solution for each equation.

19. $\sin 2x = \cos 4x$
20. $\tan\left(x - \frac{\pi}{4}\right) = 2\sin\left(x - \frac{\pi}{4}\right)$
21. $4(\sin x + 1) = 3\csc x$
22. $\tan x + \cot x = -2$
23. $1 + \cos x = 4\sin^2 x$
24. $1 + 2\cot^2 x + \csc x = 0$
25. $\tan^2 x - \sec x = 1$
26. $\cos x + \sec x = 2$
27. $\sec^2 x = 3 - \tan^2 x$
28. $\sqrt{3}\tan x = 2\sin x$

Solve each trigonometric inequality over the specified interval.

B

29. $\sin x \ge \frac{1}{2}$ over $0 \le x \le 2\pi$
30. $\cos x - \sin x \ge 0$ over $0 \le x \le 2\pi$
31. $2\cos x \le \sec x$ over $0 \le x < \frac{\pi}{2}$
32. $\csc x > 2\sin x$ over $0 < x < \frac{\pi}{2}$

Solve each equation for $0 \le x < 2\pi$.

33. $3\sin x + 2 = \cos 2x$
34. $3\cos 2x + 2\sin^2 x = 0$
35. $4\sin^2 2x + 4\cos 2x = 1$
36. $2\cos^2 2x = 3\sin 2x$
37. $2\sin 2x \sin x = 3\cos x$
38. $\sin 2x \sin x = \cos x$

Solve each inequality over the specified interval.

39. $\cos 2x \ge 0$ over $0 \le x \le \frac{\pi}{2}$
40. $\sin^2 x - \cos^2 x > 0$ over $0 \le x \le \pi$
41. $4\sin^2 2x \le 1$ over $0 \le x \le \pi$
42. $\cos^2 x \ge \sin 2x$ over $0 \le x < \frac{\pi}{2}$

Exercises 43–48: Use the trigonometric addition formulas or the double-angle formulas to solve each equation over $0 \le x < 2\pi$.

43. $4 \sin x \cos x = \sqrt{3}$

44. $4 \sin x \cos x = -\sqrt{2}$

45. $\cos 2x \cos x + \sin 2x \sin x = -\frac{1}{2}$

46. $2 \cos 3x \cos x - 2 \sin 3x \sin x = \sqrt{3}$

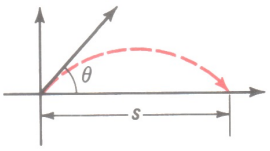
47. $\sqrt{2}(\sin x + \cos x) = \sqrt{3}$ (Hint: Square both sides.)

48. $2(\sin x - \cos x) = \sqrt{2}$

Exercises 49 and 50 use the following information. The approximate distance s in meters that an object will travel if given an initial linear speed v_0 at an angle of elevation θ is given by the formula

$$s = \frac{v_0^2 \sin \theta \cos \theta}{5}$$

where v_0 is in meters per second.



Exercises 49 and 50

49. At what angle must a football be thrown at 20 m/s in order to travel 20 m? (Disregard the height of the person throwing the ball.)

50. For what value of θ will the football in Exercise 49 travel the farthest? How far can the football travel?

51. The area of a right triangle is $\frac{1}{2}$ and the hypotenuse has length 2. Find the angles of the triangle.

52. Solve the equation $\sin \theta + \cos \theta = \sqrt{\frac{2 + \sqrt{3}}{2}}$ by squaring both sides. Be sure to check your solutions.

Solve each equation for $0° \le \theta < 360°$.

C 53. $2(\cos^4 \theta - \sin^4 \theta) = 1$

54. $4 \cos^4 \theta - 4 \cos^2 \theta = -\frac{1}{2}$ (Hint: Add 1 to both sides.)

55. $\sqrt{1 - \cos 2\theta} = 2 \sin^2 \theta$

56. $\sqrt{\cos 2\theta + 1} = 2 \cos^2 \theta$