29. Find all solutions to $2 \sin \theta \cos \theta + \sqrt{3} \sin \theta = 0$ in the interval $0° \leq \theta < 360°$.

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

30. $(2 \sin x - 1)(2 \cos^2 x - 1) = 0$

31. $4 \sin^2 x + 1 = -4 \sin x$

32. $\sqrt{2} \tan x = 2 \sin x$

33. $\sin x = \cos 2x - 1$

34. $\cot^2 x - \csc x = 1$

35. $\sin x + \cos x = 0$

36. Find all values of $\theta$ between 0 and $2\pi$ that satisfy $-1 - 3 \sin \theta = \cos 2\theta$.

**Solve each equation for all real values of $x$.**

37. $\sin x = -\frac{1}{2}$

38. $\cos x \tan x - 2 \cos^2 x = -1$

39. $3 \tan^2 x = \sqrt{3} \tan x$

40. $2 \cos^2 x = 3 \sin x$

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

42. $2 \tan^2 x - 3 \sec x = 0$

43. $\sin x \cos x = \frac{1}{2}$

44. $\cos^2 x - \sin^2 x = \frac{\sqrt{3}}{2}$

45. $\sin^4 x - 1 = 0$

46. $\sec^2 x + 2 \sec x = 0$

47. $\sin x + \cos x = 1$

48. $2 \sin x + \csc x = 3$

**Solve each inequality for $0 \leq \theta < 2\pi$.**

49. $\cos \theta \leq -\frac{\sqrt{3}}{2}$

50. $\cos \theta - \frac{1}{2} > 0$

51. $\sqrt{2} \sin \theta - 1 < 0$

**Graphing Calculator**

**Solve each equation graphically on the interval $0 \leq x < 2\pi$.**

52. $\tan x = 0.5$

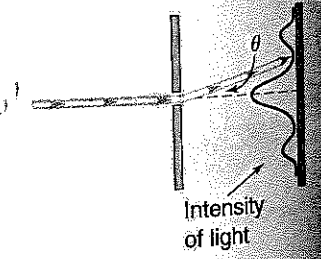
53. $\sin x - \frac{x}{2} = 0$

54. $\cos x = 3 \sin x$

**Applications and Problem Solving**

Real World Application

55. **Optics** When light passes through a small slit, it is diffracted. The angle $\theta$ subtended by the first diffraction minimum is related to the wavelength $\lambda$ of the light and the width $D$ of the slit by the equation $\sin \theta = \frac{\lambda}{D}$. Consider light of wavelength 550 nanometers ($5.5 \times 10^{-7}$ m). What is the angle subtended by the first diffraction minimum when the light passes through a slit of width 3 millimeters?




56. **Critical Thinking** Solve the inequality $\sin 2x < \sin x$ for $0 \leq x < 2\pi$ without a calculator.

57. **Physics** The range of a projectile that is launched with an initial velocity $v$ at an angle of $\theta$ with the horizontal is given by $R = \frac{v^2}{g} \sin 2\theta$, where $g$ is the acceleration due to gravity or 9.8 meters per second squared. If a projectile is launched with an initial velocity of 15 meters per second, what angle is required to achieve a range of 20 meters?