

Section 6.8

Trigonometric Equations (II)

OBJECTIVE 1

- 1 ✓ Solve Trigonometric Equations Quadratic in Form

EXAMPLE

Solving a Trigonometric Equation Quadratic in Form

Solve the equation: $2 \sin^2 \theta - 3 \sin \theta + 1 = 0$, $0 \leq \theta < 2\pi$

OBJECTIVE 2

2 Solve Trigonometric Equations Using Identities

EXAMPLE

Solving a Trigonometric Equation Using Identities

Solve the equation: $3 \cos \theta + 3 = 2 \sin^2 \theta$, $0 \leq \theta < 2\pi$

$$\sin^2 \theta = 1 - \cos^2 \theta$$

Solve the equation: $\cos(2\theta) + 3 = 5 \cos \theta$, $0 \leq \theta < 2\pi$

$$\cos(2\theta) = 2 \cos^2 \theta - 1$$

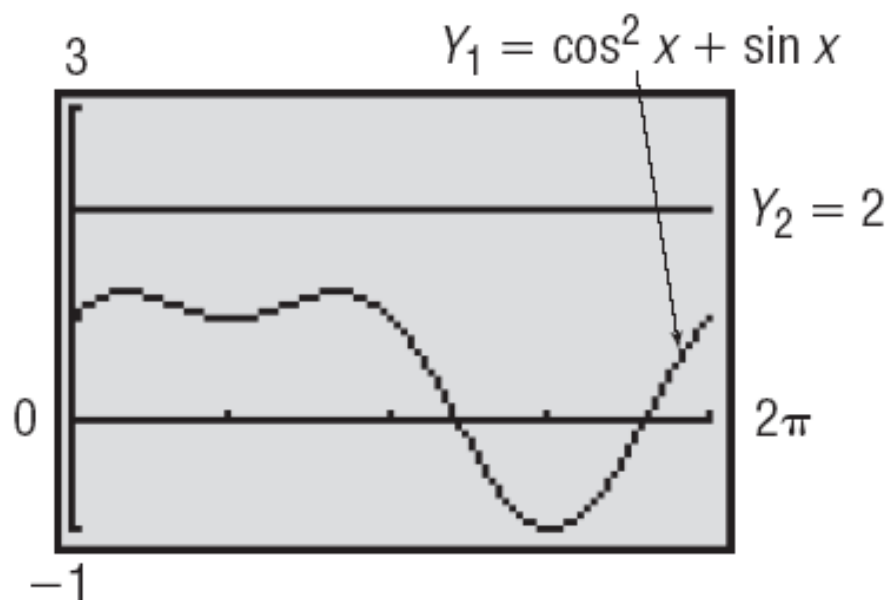
EXAMPLE

Solving a Trigonometric Equation Using Identities

Solve the equation: $\cos^2 \theta + \sin \theta = 2$, $0 \leq \theta < 2\pi$

$$\cos^2 \theta = 1 - \sin^2 \theta$$

✓ CHECK:



EXAMPLE

Solving a Trigonometric Equation Using Identities

Solve the equation: $\sin \theta \cos \theta = -\frac{1}{2}$, $0 \leq \theta < 2\pi$

$$\sin(2\theta) = 2 \sin \theta \cos \theta$$

OBJECTIVE 3

- 3 Solve Trigonometric Equations Linear in Sine and Cosine

EXAMPLE

Solving a Trigonometric Equation Linear in Sine and Cosine

Solve the equation: $\sin \theta + \cos \theta = 1$, $0 \leq \theta < 2\pi$

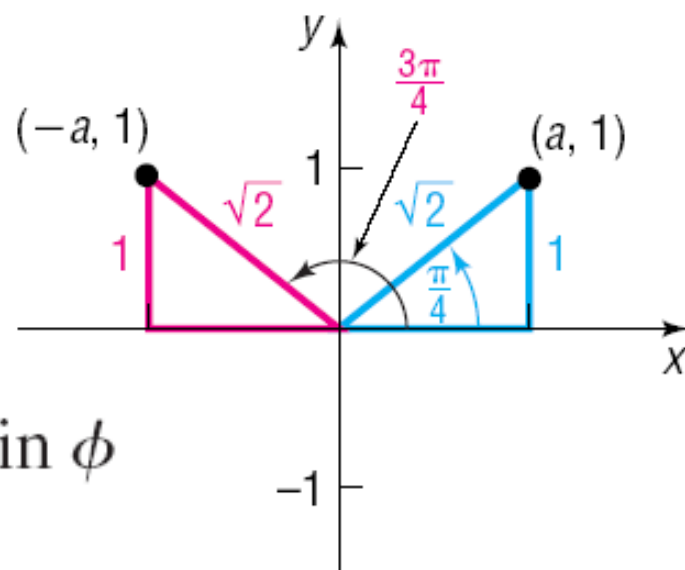
Solution A

Attempts to use available identities do not lead to equations that are easy to solve. (Try it yourself.) Given the form of this equation, we decide to square each side.

Solution B

We start with the equation $\sin \theta + \cos \theta = 1$ and divide each side by $\sqrt{2}$.

$$\sin(\theta + \phi) = \sin \theta \cos \phi + \cos \theta \sin \phi$$



EXAMPLE

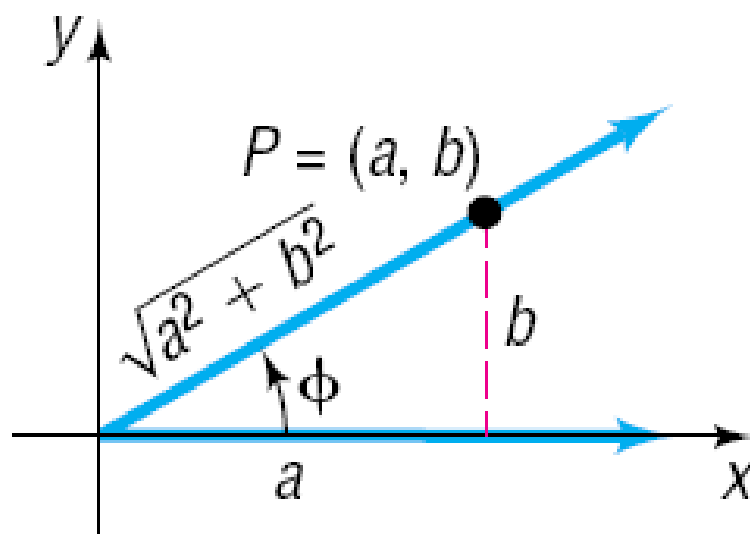
Solving a Trigonometric Equation Linear in $\sin \theta$ and $\cos \theta$

Solve:

$$a \sin \theta + b \cos \theta = c, \quad 0 \leq \theta < 2\pi$$

where a , b , and c are constants and either $a \neq 0$ or $b \neq 0$.

We divide each side of equation (2) by $\sqrt{a^2 + b^2}$.



OBJECTIVE 4

4 Solve Trigonometric Equations Using a Graphing Utility

EXAMPLE

Solving Trigonometric Equations Using a Graphing Utility

Solve: $5 \sin x + x = 3$

Express the solution(s) rounded to two decimal places.

