

**5-3 Practice****Solving Trigonometric Equations**Solve each equation for all values of  $x$ .

1.  $\cos x = 3 \cos x - 2$

2.  $2 \sin^2 x - 1 = 0$

3.  $\sqrt{\cos x} = 2 \cos x - 1$

4.  $2 \sin^2 x - 5 \sin x + 2 = 0$

Find all solutions of each equation on the interval  $[0, 2\pi)$ .

5.  $\sec^2 x + \tan x = 1$

6.  $3 \tan x - \sqrt{3} = 0$

7.  $4 \sin^2 x - 4 \sin x + 1 = 0$

8.  $4 \cos^2 x - 1 = 0$

9.  $\frac{\cos^3 x}{\sin x} = \cot x$

10.  $\tan x \sin^2 x = 3 \tan x$

**Solving Trigonometric Equations**

1. **MOUNTAIN** The height  $h$  of a mountain can be determined by the formula  $h = \frac{d}{\cot \alpha - \cot \beta}$ , where  $\alpha$  and  $\beta$  represent the angles of elevation from two different viewing positions to the top of a mountain and  $d$  represents the distance between the two positions. Find  $\alpha$  if the height of the mountain is 1 mile,  $\beta = 45^\circ$ , and  $d = \frac{3 - \sqrt{3}}{3}$  miles.

2. **ELECTRICITY** The current  $I$  in amperes in an alternating current at time  $t$  in seconds can be found with the formula  $I = 30 \sin\left(50\pi t - \frac{7\pi}{3}\right)$ . Use the formula to find the shortest time for which  $I = 15$ .

4. **STATIC FRICTION** A box sitting on a ramp is held in place by static friction. If  $p$  is the weight of the box and  $\theta$  is the angle of inclination the ramp makes with the ground, the coefficient of static friction  $\mu$  can be found using the equation  $p \sin \theta = \mu p \cos \theta$ .
- Find  $\mu$  when  $p = 20$  pounds and  $\theta = 15^\circ$ .
  - Find  $\theta$  when  $p = 35$  grams and  $\mu = 2.6$ .
5. **KITE FLYING** Jason holds a kite string taut 5 feet above the ground. When he has run out 400 feet of string, the kite is  $200\sqrt{3} + 5$  feet above the ground. Solve the equation  $h = d \sin \theta + c$  to find the angle  $\theta$  that the kite string makes with the ground, where  $h$  is the height of the kite above ground,  $d$  is the length of the string, and  $c$  is the distance from Jason's hand to the ground.