

## Practice

## Double-Angle and Half-Angle Identities

Use a half-angle identity to find the exact value of each function.

1.  $\sin 105^\circ$

2.  $\tan \frac{\pi}{8}$

3.  $\cos \frac{5\pi}{8}$

Use the given information to find  $\sin 2\theta$ ,  $\cos 2\theta$ , and  $\tan 2\theta$ .

4.  $\sin \theta = \frac{12}{13}$ ,  $0^\circ < \theta < 90^\circ$

5.  $\tan \theta = \frac{1}{2}$ ,  $\pi < \theta < \frac{3\pi}{2}$

6.  $\sec \theta = -\frac{5}{2}$ ,  $\frac{\pi}{2} < \theta < \pi$

7.  $\sin \theta = \frac{3}{5}$ ,  $0 < \theta < \frac{\pi}{2}$

Verify that each equation is an identity.

8.  $1 + \sin 2x = (\sin x + \cos x)^2$

9.  $\cos x \sin x = \frac{\sin 2x}{2}$

10. **Baseball** A batter hits a ball with an initial velocity  $v_0$  of 100 feet per second at an angle  $\theta$  to the horizontal. An outfielder catches the ball 200 feet from home plate. Find  $\theta$  if the range of a projectile is given by the formula  $R = \frac{1}{32}v_0^2 \sin 2\theta$ .