

7. $\frac{\sin \theta - \sin \theta \cos \theta}{1 - \cos \theta}$ 8. $\frac{\cos \theta \sin^2 \theta + \cos^3 \theta}{\cos \theta}$ 9. $\frac{2 \sin \theta}{1 - \cos^2 \theta}$

Prove that each equation is an identity. (Exercises 10–30)

10. $\frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} = \frac{1}{\sin \theta \cos \theta}$ 11. $\sin \theta + \frac{\cos^2 \theta}{\sin \theta} = \csc \theta$
12. $(\sin \theta + \cos \theta)^2 = 1 + 2 \sin \theta \cos \theta$ 13. $\cos^2 \theta (\cot^2 \theta + 1) = \cot^2 \theta$
14. $\cos^2 \theta - \sin^2 \theta = 1 - 2 \sin^2 \theta$ 15. $\frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{1 + \cos \theta} = \csc \theta$
16. $\frac{\cot \theta + \tan \theta}{\csc^2 \theta} = \tan \theta$ 17. $\frac{\sin \theta + \tan \theta}{\cot \theta + \csc \theta} = \sin \theta \tan \theta$
18. $\frac{\cot \theta}{1 + \cot^2 \theta} = \sin \theta \cos \theta$ 19. $\frac{1 + \cot \theta}{\cot \theta \sin \theta + \frac{\cos^2 \theta}{\sin \theta}} = \sec \theta$
20. $\frac{1 + \sec \theta}{\sin \theta + \tan \theta} = \csc \theta$ 21. $\frac{\csc \theta - \sin \theta}{\cot^2 \theta} = \sin \theta$
22. $\frac{1 + \sin \theta}{\cos \theta} = \frac{\cos \theta}{1 - \sin \theta}$ 23. $\frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta} = 2 \sec^2 \theta$
24. $\frac{\csc \theta + \cot \theta}{\tan \theta + \sin \theta} = \cot \theta \csc \theta$ 25. $\sin^2 \theta \sec^2 \theta + \sin^2 \theta \csc^2 \theta = \sec^2 \theta$
26. $\sin^4 \theta - \cos^4 \theta = 2 \sin^2 \theta - 1$ 27. $\frac{\csc \theta}{\cot \theta + \tan \theta} = \cot \theta \sin \theta$
28. $\cos \theta (2 \sec \theta + \tan \theta)(\sec \theta - 2 \tan \theta) = 2 \cos \theta - 3 \tan \theta$
29. $(\sin \theta + \cos \theta)(\tan \theta + \cot \theta) = \csc \theta + \sec \theta$
30. $\frac{1}{\csc \theta - \cot \theta} - \frac{1}{\csc \theta + \cot \theta} = 2 \cot \theta$
31. Show that the determinant equation $\begin{vmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{vmatrix} = 1$ is an identity.
32. For what value of t is $t \cos \theta \sin \theta - 1 + (\sin \theta + \cos \theta)^2 = 0$ an identity?
33. Simplify $\frac{1 - \sin \theta + \cos \theta - \sin \theta \cos \theta}{1 - \sin^3 \theta} \div \frac{1 + \cos \theta}{1 + \cos \theta + \cos^2 \theta}$.

Mixed Review

Solve. 1.4; 6.1

1. $3x - 5(2 - x) = 4 - x$

2. $7x - 4 = -2x^2$

Simplify. 17.6, 17.7, 18.5

3. $\cos \frac{3\pi}{2}$

4. $\sin 120$

5. $\tan \frac{3\pi}{4}$

6. $\cot \frac{\pi}{4}$