In Problems 1 through 34, prove that each equation is an identity.

1. $\sec x(\sec x - \cos x) = \tan^2 x$
2. $\tan x(\cot x + \tan x) = \sec^2 x$
3. $\sin x(\csc x - \sin x) = \cos^2 x$
4. $\cos x(\sec x - \cos x) = \sin^2 x$
5. $\csc^2 \theta - \cos^2 \theta \csc^2 \theta = 1$
6. $\cos^2 \theta + \tan^2 \theta \cos^2 \theta = 1$
7. $(\sec \theta + 1)(\sec \theta - 1) = \tan^2 \theta$
8. $(1 + \sin \theta)(1 - \sin \theta) = \cos^2 \theta$
9. $\sec^2 A + \tan^2 A \sec^2 A = \sec^4 A$
10. $\cot^2 A \csc^2 A - \cot^2 A = \cot^4 A$
11. $\cos^4 t - \sin^4 t = 1 - 2\sin^2 t$
12. $\sec^4 t - \tan^4 t = 1 + 2\tan^2 t$
13. $\dfrac{1}{\sin x \cos x} - \dfrac{\cos x}{\sin x} = \tan x$
14. $\dfrac{\sec x}{\sin x} - \dfrac{\sin x}{\cos x} = \cot x$
15. $\dfrac{\sin x}{\csc x} + \dfrac{\cos x}{\sec x} = 1$
16. $\dfrac{1}{\sec^2 x} + \dfrac{1}{\csc^2 x} = 1$
17. $\dfrac{1}{1 + \cos s} = \csc^2 s - \csc s \cot s$
18. $\dfrac{1}{1 - \sin r} = \sec^2 r + \sec r \tan r$
19. $\dfrac{\cos x}{\sec x - 1} - \dfrac{\cos x}{\tan^2 x} = \cot^2 x$
20. $\dfrac{\sin x}{1 - \cos x} + \dfrac{1 - \cos x}{\sin x} = 2\csc x$
21. $\dfrac{\sec x}{\sec x - \tan x} = \sec^2 x + \sec x \tan x$
22. $\dfrac{1 + \sin x}{1 - \sin x} = 2\sec^2 x + 2\sec x \tan x - 1$
23. $\sin^3 z \cos^2 z = \sin^3 z - \sin^5 z$
24. $\sin^3 z \cos^2 z = \cos^2 z \sin z - \cos^4 z \sin z$
25. $\sec^2 \theta + \csc^2 \theta = \sec^2 \theta \csc^2 \theta$
26. $\sec \theta + \tan \theta = \dfrac{1}{\sec \theta - \tan \theta}$
27. $\dfrac{1 - 3\cos x - 4\cos^2 x}{\sin^2 x} = \dfrac{1 - 4\cos x}{1 - \cos x}$
28. $\dfrac{\sec^2 x - 6\tan x + 7}{\sec^2 x - 5} = \dfrac{\tan x - 4}{\tan x + 2}$
29. $\dfrac{\sin^3 A + \cos^3 A}{\sin A + \cos A} = 1 - \sin A \cos A$
30. $\dfrac{\sec^3 B - \cos^3 B}{\sec B - \cos B} = \sec^2 B + 1 + \cos^2 B$
31. $\csc^6 x - \cot^6 x = 1 + 3\csc^2 x \cot^2 x$
32. $(2\sin x + 3\cos x)^2 + (3\sin x - 2\cos x)^2 = 13$
33. $\dfrac{1 + \sin x + \cos x}{1 + \sin x - \cos x} = \dfrac{1 + \cos x}{\sin x}$
34. $\dfrac{1 + \sin x + \cos x}{1 - \sin x + \cos x} = \dfrac{1 + \sin x}{\cos x}$

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16. $\dfrac{1}{\sec^2 x} + \dfrac{1}{\csc^2 x} = 1$
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20. $\dfrac{\sin x}{1 - \cos x} + \dfrac{1 - \cos x}{\sin x} = 2\csc x$
21. $\dfrac{\sec x}{\sec x - \tan x} = \sec^2 x + \sec x \tan x$
22. $\dfrac{1 + \sin x}{1 - \sin x} = 2\sec^2 x + 2\sec x \tan x - 1$
23. $\sin^3 z \cos^2 z = \sin^3 z - \sin^5 z$
24. $\sin^3 z \cos^2 z = \cos^2 z \sin z - \cos^4 z \sin z$
25. $\sec^2 \theta + \csc^2 \theta = \sec^2 \theta \csc^2 \theta$
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