

6.2 Verifying Trigonometric Identities

Verify that each trigonometric equation is an identity.

1. $\frac{\cot \theta}{\csc \theta} = \cos \theta$

2. $\cos^2 x \tan^2 x = \sin^2 x$

3. $\frac{1 - \sin^2 \beta}{\cos \beta} = \cos \beta$

4. $\frac{\tan^2 \alpha + 1}{\sec \alpha} = \sec \alpha$

5. $1 - \csc x \sin^3 x = \cos^2 x$

6. $\cos^2 \theta (\tan^2 \theta + 1) = 1$

7. $\sin^2 \beta (1 + \cot^2 \beta) = 1$

8. $\cot \theta + \tan \theta = \sec \theta \csc \theta$

9. $\sin^2 \alpha + \tan^2 \alpha + \cos^2 \alpha = \sec^2 \alpha$

10. $1 + \csc^2 x \cos^2 x = \csc^2 x$

11. $\frac{\cos \alpha}{\sec \alpha} + \frac{\sin \alpha}{\csc \alpha} = \sec^2 \alpha - \tan^2 \alpha$

12. $\frac{\sin^2 \theta}{\cos \theta} = \sec \theta - \cos \theta$

13. $\sin^4 \theta - \cos^4 \theta = 2 \sin^2 \theta - 1$

14. $\frac{\cos x \sin^2 x + \cos^3 x}{\sin x} = \cot x$

15. $\frac{\cos \theta}{\sin \theta \cot \theta} = 1$

16. $\frac{1 - \cos \alpha}{1 + \cos \alpha} = (\cot \alpha - \csc \alpha)^2$

17. $\sin^2 \theta (1 + \cot^2 \theta) - 1 = 0$

18. $\frac{\cos \theta + 1}{\tan^2 \theta} = \frac{\cos \theta}{\sec \theta - 1}$
19. $1 - \csc x \sin^3 x = \cos^2 x$
20. $\frac{(\sec \theta - \tan \theta)^2 + 1}{\sec \theta \csc \theta - \tan \theta \csc \theta} = 2 \tan \theta$
21. $\frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta} = 2 \sec^2 \theta$
22. $\tan^4 z = \frac{\sec^2 z - \csc^2 z + \csc^2 z \cos^2 z}{\cot^2 z}$
23. $\frac{1}{\sec \beta - \tan \beta} = \sec \beta + \tan \beta$
24. $\frac{\cot \theta + 1}{\cot \theta - 1} = \frac{1 + \tan \theta}{1 - \tan \theta}$
25. $\sin^3 x \csc x + \cos^3 x \sec x = 1$
26. $\frac{\csc \theta + \cot \theta}{\tan \theta + \sin \theta} = \cot \theta \csc \theta$
27. $1 - \sin \theta = \frac{1 - \sin^2(-\theta)}{1 - \sin(-\theta)}$
28. $\tan^2(-\theta) - \frac{\sin(-\theta)}{\sin \theta} = \sec^2 \theta$
29. $\sec^4 \alpha - \sec^2 \alpha = \tan^4 \alpha + \tan^2 \alpha$
30. $(\sec \theta - \tan \theta)^2 = \frac{1 - \sin \theta}{1 + \sin \theta}$
31. $\tan^2 x = \frac{1 - \sin^2 x \csc^2 x + \sin^2 x}{\cos^2 x}$
32. $\tan^2(-x) - \frac{\sin(-x)}{\sin x} = \sec^2 x$
33. $\frac{-1}{\tan \theta - \sec \theta} = \frac{1 + \sin \theta}{\cos \theta}$
34. $\frac{\sec x - \cos x}{\cos x} = \tan^2 x$