Prove that each equation is an identity.

1. $\tan x \cdot \dfrac{1}{\cot x} = \tan^2 x$

2. $(1 - \cos \beta)(1 + \cos \beta) = \sin^2 \beta$

3. $\cos^2 x \csc x \sec x = \cot x$

4. $(1 - \cos^2 \alpha)(\cot \alpha) = \sin \alpha \cos \alpha$

5. $\dfrac{\sin x}{\cos x} + \dfrac{\cos x}{\sin x} = \dfrac{\csc x}{\cos x}$

6. $\tan \theta \csc \theta \cos \theta = 1$

7. $(\sin x - \cos x)^2 = 1 - 2\sin x \cos x$

8. $\dfrac{\csc x}{\cos x} - \dfrac{\cos x}{\sin x} = \tan x$

9. $\csc x - \sin x = \cot x \cos x$

10. $\cot x (\tan x \sin x + \cos x) = \csc x$

11. $(1 + \sin x)(1 - \sin x) = \cos^2 x$

12. $\csc x - \sin x = \cos x \cot x$

13. $\dfrac{\sin x}{\csc x} + \dfrac{\cos x}{\sec x} = 1$

14. $\dfrac{1 + \sin x}{\cos x} = \dfrac{\cos x}{1 - \sin x}$

15. $\dfrac{\csc^2 x}{\cot^2 x} = 1 + \tan^2 x$

16. $\dfrac{\sec^2 x - 1}{\sin^2 x} = \sec^2 x$

17. $\tan^2 x - \sin^2 x = \sin^2 x \tan^2 x$

18. $\dfrac{1 - \sin^2 x}{\csc x - \sin x} = \sin x$

19. $\dfrac{\sec x - \cos x}{\cos x} = \tan^2 x$

20. $\sin x (\csc x - \sin x) = \cos^2 x$