Verifying Trigonometric Identities

Verify the following trigonometric identities.

1. $\cos x + \sin x \tan x = \sec x$

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

3. $\dfrac{1}{\tan \beta} + \tan \beta = \dfrac{\sec^2 \beta}{\tan \beta}$

4. $\dfrac{1 + \sin \theta}{\cos \theta} + \dfrac{\cos \theta}{1 + \sin \theta} = 2 \sec \theta$

5. $\sec y + \tan y = \dfrac{\cos y}{1 - \sin y}$

6. $\dfrac{\cos^2 x - \sin^2 x}{1 - \tan^2 x} = \cos^2 x$

7. $\dfrac{\sin x}{\cos x + 1} + \dfrac{\cos x - 1}{\sin x} = 0$

8. $\dfrac{\sin^2 \theta + \cos^2 \theta + \cot^2 \theta}{1 + \tan^2 \theta} = \cot^2 \theta$