1. $\cos^2 x \csc x - \csc x = (1 - \sin^2 x) \csc x - \csc x = \csc x - \sin^2 x \csc x - \csc x$
   $= -\sin^2 x \cdot \dfrac{1}{\sin x} = -\sin x$

3. $\dfrac{\cos^2 x - \tan^2 x}{\sin^2 x} = \dfrac{\cos^2 x}{\sin^2 x} - \dfrac{\tan^2 x}{\sin^2 x} = \cot^2 x - \dfrac{1}{\cos^2 x} = \cot^2 x - \sec^2 x$

5. $\dfrac{\cos^2 x}{1 - \sin x} = \dfrac{\cos x}{\dfrac{1}{\cos x}(1 - \sin x)} = \dfrac{\cos x}{\dfrac{1}{\cos x} - \dfrac{\sin x}{\cos x}} = \dfrac{\cos x}{\sec x - \tan x}$

7. $\sin^2 x \cot^2 x + \cos^2 x \tan^2 x = \sin^2 x \cdot \dfrac{\cos^2 x}{\sin^2 x} + \cos^2 x \cdot \dfrac{\sin^2 x}{\cos^2 x} = \cos^2 x + \sin^2 x = 1$

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

11. $\tan \dfrac{x}{2} = \dfrac{1 - \cos x}{\sin x} = \dfrac{1}{\sin x} - \dfrac{\cos x}{\sin x} = \csc x - \cot x$