

Verify. CHOOSE 5 OF THE 6 and circle them so I know which you want graded. 4 points each.

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

$$\begin{aligned} & \cos^2 x (1 + \tan^2 x) \\ &= \cos^2 x \sec^2 x \\ &= \frac{\cos^2 x}{1} \cdot \frac{1}{\cos^2 x} \\ &= 1 \end{aligned}$$

2. $\frac{1}{1-\sin(x)} + \frac{1}{1+\sin(x)} = 2 \sec^2(x)$

$$\begin{aligned} & \frac{1+\sin(x) + 1-\sin(x)}{(1-\sin x)(1+\sin x)} = \frac{2}{1-\sin^2 x} \\ &= \frac{2}{\cos^2 x} = 2 \cdot \frac{1}{\cos^2 x} \\ &= 2 \sec^2 x \end{aligned}$$

3. $\tan(x) \csc(x) = \sec(x)$

$$\begin{aligned} & \frac{\sin x}{\cos x} \cdot \frac{1}{\sin x} \\ &= \frac{1}{\cos x} \\ &= \sec x \end{aligned}$$

4. $\frac{\tan^2(x)+1}{1+\cot^2(x)} = \tan^2(x)$

$$\begin{aligned} & \frac{\sec^2 x}{\csc^2 x} = \frac{\frac{1}{\cos^2 x}}{\frac{1}{\sin^2 x}} \\ &= \frac{1}{\cos^2 x} \cdot \frac{\sin^2 x}{1} \\ &= \frac{\sin^2 x}{\cos^2 x} \\ &= \tan^2 x \end{aligned}$$

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

$$\begin{aligned} &= \frac{\sin x}{\cos x} - \frac{\cos x}{\sin x} \\ &= \frac{\sin^2 x - \cos^2 x}{\cos x \sin x} \\ &= \frac{\sin^2 x + \sin^2 x - 1}{\cos x \sin x} \\ &= \frac{2 \sin^2 x - 1}{\cos x \sin x} \end{aligned}$$

6. $\sin(x)[\csc(x) - \sin(x)] = \cos^2(x)$

$$\begin{aligned} & \sin x \csc x - \sin^2 x \\ &= \sin x \cdot \frac{1}{\sin x} - \sin^2 x \\ &= \frac{\sin x}{\sin x} - \sin^2 x \\ &= 1 - \sin^2 x \\ &= \cos^2 x \end{aligned}$$

7. $\frac{1-\sin^2(x)}{\csc^2(x)-1} = \sin^2(x)$

$$\begin{aligned} & \frac{\cos^2 x}{\frac{1}{\sin^2 x} - 1} = \frac{\cos^2 x}{\frac{1 - \sin^2 x}{\sin^2 x}} = \frac{\cos^2 x \sin^2 x}{1 - \sin^2 x} \\ &= \sin^2 x \end{aligned}$$

8. $\tan^2(x) - \tan^2(x) \sin^2(x) = \sin^2(x)$

$$\begin{aligned} & \tan^2 x [1 - \sin^2 x] \\ &= \tan^2 x \cos^2 x \\ &= \frac{\sin^2 x}{\cos^2 x} \cdot \frac{\cos^2 x}{1} = \sin^2 x \end{aligned}$$

9. $\frac{\sin(x)}{1-\cos(x)} + \frac{1-\cos(x)}{\sin(x)} = 2 \csc(x)$

$$\begin{aligned} & \frac{\sin^2 x + (1-\cos x)(1-\cos x)}{(1-\cos x) \sin x} \\ &= \frac{\sin^2 x + 1 - 2\cos x + \cos^2 x}{(1-\cos x) \sin x} \\ &= \frac{1 + 1 - 2\cos x}{(1-\cos x) \sin x} = \frac{2(1-\cos x)}{(1-\cos x) \sin x} \\ &= \frac{2}{\sin x} = 2 \cdot \frac{1}{\sin x} = 2 \csc x \end{aligned}$$

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

$$\begin{aligned} & \cos x + \frac{\sin x}{1} \cdot \frac{\sin x}{\cos x} \\ &= \frac{\cos x}{1} + \frac{\sin^2 x}{\cos x} \\ &= \frac{\cos^2 x + \sin^2 x}{\cos x} \\ &= \frac{1}{\cos x} = \sec x \end{aligned}$$