

8.2 Verifying Trig Identities Notes

Verify the following. Make sure to show all work.

$\tan x + \cot x = \sec x \csc x$

$\frac{\sin x}{\sin x} \left( \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} \cdot \frac{\cos x}{\cos x} \right)$

$\frac{\sin^2 x + \cos^2 x}{\sin x \cos x} = \frac{1}{\sin x \cos x}$

$\frac{1}{\sin x} \cdot \frac{1}{\cos x}$

$\csc x \sec x$

$\frac{\sin x}{1 - \cos x} = \csc x + \cot x$

$\frac{(\sin x)}{(1 - \cos x)} \cdot \frac{(1 + \cos x)}{(1 + \cos x)}$

$\frac{\sin x + \sin x \cos x}{1 - \cos^2 x}$   
 $\frac{\sin x + \sin x \cos x}{\sin^2 x}$

$\frac{\cancel{\sin x} (1 + \cos x)}{\sin^2 x} = \frac{1 + \cos x}{\sin x}$

$\frac{1}{\sin x} + \frac{\cos x}{\sin x} = \csc x + \cot x$

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

$(\sin x + \cos x + 1)(\sin x + \cos x + 1)$

$\sin^2 x + \sin x \cos x + \sin x + \sin x \cos x + \cos^2 x + \cos x + \sin x + \cos x + 1$

$\frac{1+1}{2} + 2\sin x \cos x + 2\cos x + 2\sin x$

$2(1 + \sin x \cos x + \cos x + \sin x)$

$2(\sin x \cos x + \sin x + \cos x + 1)$

$2(\sin x (\cos x + 1) + \cos x + 1)$

$2(\sin x (\cos x + 1) + 1 (\cos x + 1))$

$2(\cos x + 1)(\sin x + 1)$

$\cot x \sec x \csc^2 x - \cot^3 x \sec x = \csc x$

$\cot x \sec x (\csc^2 x - \cot^2 x)$   
 $= 1$  pythag. identity

$\cot x \sec x$

$\frac{\cos x}{\sin x} \cdot \frac{1}{\cos x} = \frac{1}{\sin x} = \csc x$