Simplifying Trig Expressions

1. $(\sin\theta)(\csc\theta)$

$\frac{\sin\theta}{1} \cdot \frac{1}{\sin\theta} = \boxed{1}$

2. $\frac{1}{\csc x} \cdot \cot x$

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

$\cos x \cdot \cos x = \cos^2 x$

3. $\cos^2 x \cdot \tan^2 x + \cos^2 x$

$\frac{a \cdot b}{a} + \frac{a}{a} = a(b+1)$

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

$\cos^2 x \cdot \sec^2 x$

$\frac{\cos^2 x}{1} \cdot \frac{1}{\cos^2 x}$

$= \boxed{1}$

$\cos^2 x \left(\frac{\sin^2 x}{\cos^2 x}\right) + \cos^2 x$

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

$\boxed{1}$

4. $\cos\theta \cdot \cot\theta + \sin\theta$

* get a common denom.

$\cos\theta \cdot \frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{1}\left(\frac{\sin\theta}{\sin\theta}\right)$

$\frac{\cos^2\theta}{\sin\theta} + \frac{\sin^2\theta}{\sin\theta}$

$\frac{\cos^2\theta + \sin^2\theta}{\sin\theta} = \frac{1}{\sin\theta} = \boxed{\csc\theta}$

5. $\cos x(\cos x - \sec x)$

$\cos^2 x - \cos x \sec x$

$\cos^2 x - \cos x \cdot \frac{1}{\cos x}$

$\cos^2 x - 1$

$-\sin^2 x$

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

$\sin^2 x = 1 - \cos^2 x$

$-\sin^2 x = \cos^2 x - 1$

6. $\dfrac{1-\cos^2 x}{1+\cos x}$ difference of 2 perfect squares

$= \dfrac{(1+\cos x)(1-\cos x)}{1+\cos x} = 1-\cos x$

7. $\cot^4 x + 2\cot^2 x + 1$

$(\cot^2 x + 1)(\cot^2 x + 1)$

$\csc^2 x \cdot \csc^2 x$

$\csc^4 x$

8. $\dfrac{\sin(-x)}{\tan x}$

$= \dfrac{-\sin x}{\sin x/\cos x} = -\sin x \cdot \dfrac{\cos x}{\sin x}$

$= -\cos x$