Name: Key

5.2 Verifying Trig Identities

1) $\csc\theta\cot^2\theta+\dfrac{1}{\sin\theta}=\csc^3\theta$

$\frac{\cos^2\theta}{\sin^3\theta}+\frac{1}{\sin\theta}\left(\frac{\sin^2\theta}{\sin^2\theta}\right)=$

$\frac{\cos^2\theta+\sin^2\theta}{\sin^3\theta}=$

$\frac{1}{\sin^3\theta}=$

$\csc^3\theta=\csc^3\theta$ ✓

2) $\dfrac{\sec^2\theta-1}{\sec^2\theta}=\sin^2\theta$

$\frac{\sec^2\theta}{\sec^2\theta}-\frac{1}{\sec^2\theta}=$

$1-\cos^2\theta=$

$\sin^2\theta=\sin^2\theta$ ✓

3) $\dfrac{\cos x}{1-\sin x}=\sec x+\tan x$

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

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

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

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

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

$\sec x+\tan x=$ ✓

4) $\dfrac{\csc^2 x-\cot^2 x}{1-\sin^2 x}=\sec^2 x$

$\cos^2 x$

$\frac{(1+\cot^2 x)-\cot^2 x}{\cos^2 x}$

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

$\sec^2 x=\sec^2 x$ ✓

5) $\dfrac{\cot^2 x}{\csc x}=\csc x-\sin x$

$1+\cot^2 x=\csc^2 x$

$\frac{\csc^2 x-1}{\csc x}=$

$\frac{\csc^2 x}{\csc x}-\frac{1}{\csc x}=$

$\csc x-\frac{1}{\csc x}=$

$\csc x-\sin x=\csc x-\sin x$ ✓

6) $\sec^3 x=\sec x\tan^2 x+\sec x$

$=\sec\left(\tan^2 x+1\right)$

$=\sec\left(\sec^2 x\right)$

$\sec^3 x=\sec^3 x$ ✓

7) $\tan x \sin x = \sec x - \cos x$

$= \frac{1}{\cos x} - \frac{\cos x}{1}\left(\frac{\cos x}{\cos x}\right)$

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

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

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

$\tan x \cdot \sin x \overset{\checkmark}{=} \tan x \cdot \sin x$

8) $\tan x = \sin x \sec x$

$= \sin x \left(\frac{1}{\cos x}\right)$

$= \frac{\sin x}{\cos x}$

$\tan x \overset{\checkmark}{=} \tan x$

9) $\frac{1-\cos^2\theta}{\cos^2\theta} = \tan^2\theta$

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

$\tan^2\theta \overset{\checkmark}{=} \tan^2\theta$

10) $\frac{(\sin x + \cos x)^2}{\sin x \cos x} = 2 + \sec x \csc x$ $(\sin x + \cos x)$

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

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

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

$2 + \sec x \csc x \overset{\checkmark}{=} 2 + \sec x \csc x$

11) $\sec x \csc x(\tan x + \cot x) = \sec^2 x + \csc^2 x$

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

$\left(\frac{1}{\cos x}\right)\left(\frac{1}{\sin x}\right)\left(\frac{\sin x}{\cos x}\right) + \left(\frac{1}{\cos x}\right)\left(\frac{1}{\sin x}\right)\left(\frac{\cos x}{\sin x}\right) =$

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

$\sec^2 x + \csc^2 x \overset{\checkmark}{=} \sec^2 x + \csc^2 x$

12) $\frac{\cos x}{1-\sin x} - \frac{1+\sin x}{\cos x} = 0$ $(\cos x)$ $(1-\sin x)$ $(\cos x)$ $(1-\sin x)$

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

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

$0 \overset{\checkmark}{=} 0$