Introduction

6.4

I can solve trigonometric equations using identities.

IDENTITIES

Quotient Identities	
$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$	$\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

Reciprocal Identities		
$\sin\theta = \dfrac{1}{\csc\theta}$	$\cos\theta = \dfrac{1}{\sec\theta}$	$\tan\theta = \dfrac{1}{\cot\theta}$
$\csc\theta = \dfrac{1}{\sin\theta}$	$\sec\theta = \dfrac{1}{\cos\theta}$	$\cot\theta = \dfrac{1}{\tan\theta}$

Pythagorean Identities	
★ 1 $\sin^2\theta + \cos^2\theta = 1$ ★	
2 $1 + \tan^2\theta = \sec^2\theta$	3 $1 + \cot^2\theta = \csc^2\theta$

1b. $\sin^2\theta = 1 - \cos^2\theta$

1c. $\cos^2\theta = 1 - \sin^2\theta$

2b. $\tan^2\theta = \sec^2\theta - 1$

2c. $1 = \sec^2\theta - \tan^2\theta$

3b. $\cot^2\theta = \csc^2\theta - 1$

3c. $1 = \csc^2\theta - \cot^2\theta$

Tips For Using Identities To Simplify Expressions

* If the expression has multiple trig functions, try to convert all of them to the same trig function.
* If one or more of the trig functions are squared, try using one of the Pythagorean Identities to rewrite the expression, then simplify to get a factorable expression.
* When all else fails, turn your expression into sines and cosines.

Simplify the following in terms of SINE.

1.) $\sin x + \sin x \cot^2 x$

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

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

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

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

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

$\sin x (\csc^2 x)$

$\frac{\cancel{\sin x}}{1} \left(\frac{1}{\sin^{\cancel{2}} x}\right)$

$\boxed{\frac{1}{\sin x}}$

Simplify.

4.) $\sin^2 x \cot^2 x + \cos^2 x \tan^2 x$

$$\frac{\cancel{\sin^2 x}}{1} \cdot \frac{\cos^2 x}{\cancel{\sin^2 x}} + \cos^2 x \tan^2 x$$

$$\cos^2 x + \cos^2 x \tan^2 x$$

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

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

$$\boxed{1}$$

Simplify.

5.) $2\cos^2 x - \sin x - 1$