Video Quiz 6

1. (2 pts.) Simplify the following expression: $\frac{1-\csc^2 x}{\cot x}$. (*Hint: Use a Pythagorean Identity*)

$$\frac{1-\csc^2 x}{\cot x} = \frac{-\cot^2 x}{\cot x} = \frac{-(\cot x)(\cancel{\cot x})}{\cancel{\cot x}} = \boxed{-\cot x}$$

2. (2 pts.) Simplify the following expression: $\sin x - \frac{\tan(-x)}{\sec x}$. (*Hint: Break things into sines and cosines and use negative identities*)

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

$$= \sin x - \frac{(-\sin x)\cancel{\cos x}}{\cancel{\cos x}}$$

$$= \sin x - (-\sin x)$$

$$= \sin x + \sin x$$

$$= \boxed{2\sin x}$$

3. (2 pts.) Simplify the following expression: $\sec x \csc x - \sec x \sin x$ (*Hint: Break things into sines and cosines using reciprocal identities, then make a common denominator of* $\sin x \cos x$)

$$\sec x \csc x - \sec x \sin x$$

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

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

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

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

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

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

$$= \boxed{\cot x}$$

4. (2 pts.) *True or False*: $\sec^2 x - \tan^2 x = 1$ is an identity, i.e. this statement is true for ALL values x

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

$$\Rightarrow \tan^2 x + 1 = \sec^2 x$$

$$\Rightarrow 1 = \sec^2 x - \tan^2 x \quad \boxed{\text{True}}$$

$$\sec^2 x - \tan^2 x$$

$$= \tan^2 x + 1 - \tan^2 x$$

$$= 1$$

$$\boxed{\text{true}}$$

5. (2 pt.) *True or False*: $\sin(-x) - \sin(-x) = 0$ is an identity, i.e. this statement is true for ALL values x

$$\sin(-x) - \sin(-x) = -\sin x - (-\sin x)$$

$$= -\sin x + \sin x$$

$$= 0$$

$$\boxed{\text{true}}$$

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

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

$$= \boxed{1+\cos x}$$