

Warm Up

Prove the following identity:

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

$$\frac{\sin x (1 + \cos x) - \sin x \cos x (1 - \cos x)}{\text{FOIL} \rightarrow (1 - \cos x)(1 + \cos x)}$$

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

$$\text{Factor} \rightarrow \frac{\sin x + \sin x \cos^2 x}{\sin^2 x}$$

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

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

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

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

Questions from Homework

$$\textcircled{2} \quad \boxed{\csc x} (\sin x + \cos x) = \boxed{1 + \cot x}$$

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

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

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

$$\boxed{1 + \cot x}$$

Bonus

Prove the following identity:

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

Foil \rightarrow

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

Pythagorean = 1

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

Factor \rightarrow

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

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

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

$$2 \left(\frac{1}{\cos x} \right)$$

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

Quiz & Homework