

7.3 Practice

* Answers

Verify the following identities. *may vary*

1.) $\sin^3 x = \sin x - \sin x \cos^2 x$

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

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

$$\sin^3 x = \sin^3 x$$

2.) $\frac{3\sin^2 x + 2\sin x - 1}{\cos^2 x} = \frac{3\sin x - 1}{1 - \sin x}$

$$\frac{(3\sin x - 1)(\sin x + 1)}{1 - \sin^2 x} =$$

$$\frac{(3\sin x - 1)(\cancel{\sin x + 1})}{(1 - \sin x)(\cancel{1 + \sin x})} =$$

$$\frac{3\sin x - 1}{1 - \sin x} = \frac{3\sin x - 1}{1 - \sin x}$$

3.) $\cot^2 x \sec^2 x - \cot^2 x = 1$

$$\cot^2 x (\sec^2 x - 1) = 1$$

$$\cot^2 x (\tan^2 x) =$$

$$\frac{1}{\tan^2 x} \cdot \left(\frac{\tan^2 x}{1} \right) =$$

$$1 = 1$$

4.) $\sin x = \frac{\cos x \cot x + \cos x}{\cot x + \cot^2 x}$

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

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

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

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

$$\sin x = \sin x$$

$$5.) \sec^4 x - \tan^4 x = 2 \tan^2 x + 1$$

$$(\sec^2 x - \tan^2 x)(\sec^2 x + \tan^2 x) =$$

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

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

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

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

$$6.) \frac{\sec x + 1}{2 \sec x + 3} = \frac{\tan^2 x}{2 \sec^2 x + \sec x - 3}$$

$$= \frac{\sec^2 x - 1}{(\sec x - 1)(2 \sec x + 3)}$$

$$\frac{(\cancel{\sec x - 1})(\sec x + 1)}{(\cancel{\sec x - 1})(2 \sec x + 3)}$$

$$\frac{\sec x + 1}{2 \sec x + 3} = \frac{\sec x + 1}{2 \sec x + 3}$$

$$7.) \frac{\cot^2 x}{4 \csc^2 x - 7 \csc x + 3} = \frac{\csc x + 1}{4 \csc x - 3}$$

$$\frac{\csc^2 x - 1}{(4 \csc x - 3)(\csc x - 1)}$$

$$\frac{(\cancel{\csc x - 1})(\csc x + 1)}{(\cancel{4 \csc x - 3})(\csc x - 1)}$$

$$\frac{\csc x + 1}{4 \csc x - 3} = \frac{\csc x + 1}{4 \csc x - 3}$$

$$8.) \csc x = \cot x \sec x \csc^2 x - \cot^3 x \sec x$$

$$\cot x \sec x (\csc^2 x - \cot^2 x)$$

$$\cot x \sec x (1)$$

$$\cot x \sec x$$

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

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

$$\csc x = \csc x$$