Precalculus Review 5.1-5.2

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1) List the 3 pythagorean identities.

$\sin^2 x + \cos^2 x = 1$
$1 + \tan^2 x = \sec^2 x$
$\cot^2 x + 1 = \csc^2 x$

Use the fundamental identities to find the value of the trigonometric function.

2) Given that $\sin\theta = \frac{1}{5}$, find $\sec(\pi/2 - \theta)$.

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Use basic identities to simplify the expression.

3) $\cot\theta \sec\theta \sin\theta$

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

Find all solutions in the interval $[0, 2\pi)$.

4) $\cos^2 x + 2\cos x + 1 = 0$

$(\cos x + 1)(\cos x + 1) = 0$
$\cos x = -1$
$x = \pi$

5) $2\sin^2 x = \sin x$

$2\sin^2 x - \sin x = 0$
$\sin x(2\sin x - 1) = 0$
$\sin x = 0 \quad 2\sin x - 1 = 0$
$\sin x = \frac{1}{2}$
$x = 0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}$

6) $4\sin^2 x - 4\sin x + 1 = 0$

$(2\sin x - 1)(2\sin x - 1) = 0$
$2\sin x - 1 = 0$
$\sin x = \frac{1}{2}$
$x = \frac{\pi}{6}, \frac{5\pi}{6}$

Use basic identities to simplify the expression.

7) $\frac{\tan\theta}{\sec\theta}$

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

Simplify the expression. Use Pythagorean Identities.

8) $(\sin^2 x + \cos^2 x) - (\csc^2 x - \cot^2 x)$

$1 - \csc^2 x + \cot^2 x$
$1 - (\cot^2 x + 1) + \cot^2 x$
$1 - \cot^2 x - 1 + \cot^2 x$
$1 - 1 - \cot^2 x + \cot^2 x$
0

Prove the identity.

9) $\sin x \sec x \cot x = 1$

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

Determine if the following is an identity.

10) $\tan^2 x = \sec^2 x - \sin^2 x - \cos^2 x$

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

$= (1 + \tan^2 x) - (1 - \cos^2 x) - \cos^2 x$

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

$= \tan^2 x$ ✓

Prove the identity.

11) $\frac{\cot x}{1 + \csc x} = \frac{\csc x - 1}{\cot x}$ $\left(\frac{\csc x + 1}{\csc x + 1}\right)$

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

$= \frac{\cot^2 x}{\cot x(\csc x + 1)}$

$= \frac{\cot x}{\csc x + 1}$ ✓