Chapter 6 Test

Multiple Choice

For #1 to #5, choose the best answer.

1. Simplify the expression \(\frac{\cot^2 \theta}{1 + \cot^2 \theta}\).
   A \quad \cos^2 \theta \\
   B \quad \sin^2 \theta \\
   C \quad \tan^2 \theta \\
   D \quad \sec^2 \theta

2. The value of \((\sin x - \cos x)^2 + \sin 2x\) is
   A \quad -1 \\
   B \quad 0 \\
   C \quad 1 \\
   D \quad 2

3. The expression \(\frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}\) is equivalent to
   A \quad \cos 2\theta \\
   B \quad \sin 2\theta \\
   C \quad \cos^2 \theta \\
   D \quad \sin^2 \theta

4. If you simplify \(\sin (\pi + x) + \sin (\pi - x)\) it is
   A \quad -2 \\
   B \quad 0 \\
   C \quad 2 \\
   D \quad not possible

5. Which of the following is not an identity?
   A \quad \sec \theta - \cos \theta = \sin \theta \tan \theta \\
   B \quad 1 - \cos^2 \theta = \cos^2 \theta \tan^2 \theta \\
   C \quad \csc \theta - \cos \theta \tan \theta = \frac{\cos \theta}{\tan \theta} \\
   D \quad \cos^2 \theta = \frac{1 - \cos 2\theta}{2}

Short Answer

6. Determine the exact value of \(\sin \left(-\frac{5\pi}{12}\right)\).

7. Given \(\frac{\sin^2 x}{1 - \cos x} = 1.23\).
   What is the value of \(\cos x\)?

8. If \(5 - 7 \sin \theta - 2 \cos^2 \theta = 0\) on the domain \(90^\circ \leq \theta \leq 180^\circ\), what is the value of \(\theta\)?

9. If \(\cos \theta = -\frac{5}{13}\), \(\pi \leq \theta \leq \frac{3\pi}{2}\), determine the exact value of \(\sin \left(\theta - \frac{\pi}{2}\right)\).

10. What single trigonometric function is equivalent to
    \(\sin (3y) \cos \left(\frac{y}{2}\right) - \cos(3y)\sin \left(\frac{y}{2}\right)\)?

Extended Response

11. Consider the equation
    \(\sin \left(x + \frac{\pi}{2}\right) = \csc x - 1\)
    a) Verify the equation is true for \(x = \frac{\pi}{2}\).
    b) Is the equation an identity? Explain.

12. Consider the equation
    \(\sin^2 x + \cos^4 x = \cos^2 x + \sin^4 x\).
    a) Verify the equation for \(x = 30^\circ\).
    b) Prove the equation is an identity.

13. Consider the equation
    \(\tan x + \sec x = \frac{\sin x}{\cot x} = \frac{\sin x}{1 - \sin x}\).
    a) State the non-permissible values on the domain \(0^\circ \leq x \leq 360^\circ\).
    b) Prove the equation is an identity algebraically.

14. Solve \(\sin 2x - \cos x = 0\) algebraically for the domain \(-\pi \leq x \leq \pi\).

15. Solve \(\csc^2 x = 4 \cot^2 x\) algebraically. State the general solution in radians.