Name: _____   Date: _____

Chapter 5 Review

5.1 Graphs of Sine, Cosine, and Tangent Functions

1. The graph of a cosine function has a maximum of -1 and a minimum of -9.
   a) Determine the amplitude of the function.
   b) Determine the vertical translation of the function.

2. Write the equation of the tangent function which has a period of π and a phase shift of $+\dfrac{\pi}{4}$.

3. One cycle of a sine function begins at $x = -\dfrac{\pi}{6}$ and ends at $x = \dfrac{7\pi}{4}$.
   a) Determine the period of the function.
   b) What value of k is required in the equation of the function?

5.2 Graphs of Reciprocal Trigonometric Functions

4. Determine all values of x in the interval $[0, 2\pi]$ such that $\sec x = -6$. Round your answer to two decimal places.

5. **a)** A person stands away from a building which is 25 m high. From where the person stands, the angle of elevation to the top of the building is x. Determine a reciprocal trigonometric relation for the distance that the person is from the building.
   b) Sketch a graph of the function found in part a) on the interval $x \in \left[0, \dfrac{\pi}{2}\right]$.
   c) Interpret the meaning of the graph as x approaches 0 and as x approaches $\dfrac{\pi}{2}$.

5.3 Sinusoidal Functions of the Form $f(x) = a \sin[k(x - d)] + c$ and $f(x) = a \cos[k(x - d)] + c$

6. Determine the amplitude, period, phase shift, and vertical translation, if it exists, for each function with respect to $y = \cos x$.
   a) $y = -4 \cos[2(x + 2.5)]$
   b) $y = \dfrac{1}{4} \cos\left[3\left(x + \dfrac{3\pi}{4}\right)\right] - 5$
   c) $y = -\cos\left(\dfrac{1}{2}x - \dfrac{\pi}{3}\right) + 3.5$

7. A cosine function has a maximum value of 7, a minimum value of 1, a period of $\dfrac{\pi}{2}$, and a phase shift of $\dfrac{3\pi}{4}$ rad to the right.
   a) Write an equation for the function.
   b) Graph the function and verify that it satisfies the properties given.

5.4 Solve Trigonometric Equations

8. **a)** Determine approximate solutions for each equation in the interval $x \in [0, 2\pi]$, to the nearest hundredth of a radian.
   i) $\sin x - 0.8 = 0$
   ii) $\tan x - \dfrac{3}{4} = 0$
   iii) $\sec x + 4 = 0$
   iv) $4 \csc x + 5 = 0$
   b) Verify your solutions to part a) by graphing.

9. Determine approximate solutions for each equation in the interval $x \in [0, 2\pi]$, to the nearest hundredth of a radian.
   a) $\sec^2 x - \dfrac{49}{9} = 0$
   b) $\tan^2 x - 2.25 = 0$
   c) $64 \sin^2 x - 25 = 0$
   d) $\csc^2 x - 6.25 = 0$

10. Determine exact solutions for the equation $2 \sin 2x = 0$ in the interval $x \in [0, 2\pi]$.

11. a) Determine the solutions for the equation $2 \csc^2 x - 9 \csc x + 10 = 0$ in the interval $x \in [0, 2\pi]$. Give exact solutions where possible. If not possible, round to the nearest hundredth of a radian.
   b) Verify your solutions to part a) by graphing.

5.5 Making Connections and Instantaneous Rate of Change
12. A mass at the end of a spring bobs up and down vertically. Its changing height is given by the function $h = -3 \sin t + 8$, where h is the height, in metres, and t is the time, in seconds, $0 \le t \le 10$.
   a) At what time(s) during a cycle does the instantaneous rate of change of the height appear to equal zero?
   b) At what time(s) during a cycle does the instantaneous rate of change appear to be a maximum value? a minimum value?