Chapter 6 Review

1. **(Lesson 6.1)** Suppose $y = 4\cos(3\pi t - 6) + 2$.
   (a) The midline of the graph is the line with equation _____.
   (b) The amplitude of the graph is _____.
   (c) The period of the graph is _____.
   (d) The phase shift (as *C/B*) is _____.

2. Suppose *x* is measured in radians. Find the derivative of each of the six trigonometric functions. You should memorize these formulas.

   (Lesson 6.2)
   (a) $(\sin x)' =$ _____
   (b) $(\cos x)' =$ _____

   (Lesson 6.3)
   (c) $(\tan x)' =$ _____
   (d) $(\cot x)' =$ _____

   (Lesson 6.3)
   (e) $(\sec x)' =$ _____
   (f) $(\csc x)' =$ _____

3. **(Lesson 6.2)** The height of a tide above the ocean floor is given by $h(t) = 6.25\sin(0.57t) + 10$ meters, where *t* is hours after noon on June 1, 2013.
   (a) Find the height of the tide at 3:00 p.m. on June 1, 2013.
   (b) Find the rate at which the tide is rising or falling at 3:00 p.m. on June 1, 2013.
   (c) Find the acceleration of the tide at 3:00 p.m. on June 1, 2013.

4. **(Lesson 6.4)** Suppose *x* is measured in radians. Find the derivative of each inverse trigonometric function. You should memorize these formulas.
   (a) $(\sin^{-1} x)' =$ _____
   (b) $(\cos^{-1} x)' =$ _____
   (c) $(\tan^{-1} x)' =$ _____

5. **(Lesson 6.3)**
   (a) If $h(x) = \dfrac{\sec^3(x)}{\tan(3x)}$, then $h'(x) =$ _____.

   (Lesson 6.4)
   (b) If $f(x) = \sin(2x)\arctan(x)$, then $f'(x) =$ _____.
   (c) If $g(x) = \sin^{-1}(\cos(7x))$, then $g'(x) =$ _____.

6. Suppose x is measured in radians. Find the family of antiderivatives of each of the following functions. You should memorize these formulas.

(Lesson 6.2)

(a) $\int \sin x \, dx =$ _____

(b) $\int \cos x \, dx =$ _____

(Lesson 6.3)

(c) $\int \sec^2 x \, dx =$ _____

(d) $\int \sec x \tan x \, dx =$ _____

(Lesson 6.3)

(e) $\int \csc^2 x \, dx =$ _____

(f) $\int \csc x \cot x \, dx =$ _____

7. Evaluate each integral.

(Lesson 6.2)

(a) $\int \frac{9x^2 + x^3 \cos x}{x^3} \, dx =$ _____

(b) $\int_0^{\pi/16} \sin(8\theta) \, d\theta =$ _____

(Lesson 6.3)

(c) $\int \sec^2(1.8x - 2.3) \, dx =$ _____

8. **(Lesson 6.4)** Evaluate each indefinite integral. You should memorize these formulas.

(a) $\int \frac{1}{1+x^2} \, dx =$ _____

(b) $\int \frac{1}{\sqrt{1-x^2}} \, dx =$ _____

(c) $\int \frac{-1}{\sqrt{1-x^2}} \, dx =$ _____

9. **(Lesson 6.4)** Evaluate each integral without explicitly writing out the necessary substitution. In Part (b), you will need to rewrite the integral by dividing each term by 9.

(a) $\int_0^{0.2} \frac{4}{\sqrt{1-(2x)^2}} \, dx = \underline{\qquad\qquad}\Big|_0^{0.2} =$ _____

(b) $\int_1^4 \frac{18}{9 + x^2} \, dx = \underline{\qquad\qquad}\Big|_1^4 =$ _____

10. **(Lesson 6.3)** Evaluate $\lim_{x \to 0} \frac{5\tan(4x)}{3\sin(2x)}$ using L'Hôpital's rule.