Math 1: Calculus with Algebra   **Quiz 5**

Fall 2015   Name: <u>Answer Key</u>

Instructions: (24 points) This quiz consists of 4 problems. Credit is awarded for correct solutions in which you **show your work**. You will have 30 minutes to complete this quiz. You may not use a calculator, textbook, notes, or any outside source while taking this quiz.

(6$^{\text{pts}}$)   **1.** Find $\dfrac{d}{dx}\left(\dfrac{4x^2 - \pi}{e^x}\right)$.

         Solution: Using the quotient rule, we find

$$\frac{d}{dx}\left(\frac{4x^2 - \pi}{e^x}\right) = \frac{e^x \cdot \frac{d}{dx}(4x^2 - \pi) - (4x^2 - \pi)\cdot \frac{d}{dx}(e^x)}{(e^x)^2} = \frac{e^x(8x) - (4x^2 - \pi)e^x}{e^{2x}} = \frac{8x - 4x^2 + \pi}{e^x}$$

(6$^{\text{pts}}$)   **2.** Write down the derivative formulas for each of the 6 trigonometric functions.

$$\frac{d}{dx}\sin(x) = \cos(x) \qquad\qquad\qquad\qquad \frac{d}{dx}\cos(x) = -\sin(x)$$

$$\frac{d}{dx}\csc(x) = -\csc(x)\cot(x) \qquad\qquad\qquad \frac{d}{dx}\sec(x) = \sec(x)\tan(x)$$

$$\frac{d}{dx}\tan(x) = \sec^2(x) \qquad\qquad\qquad\qquad \frac{d}{dx}\cot(x) = -\csc^2(x)$$

(6$^{\text{pts}}$)   **3.** Find the velocity and acceleration functions of $s(x) = x^2 \ln(x)$. (Don't worry about units.)

Solution: The velocity function is

$$v(x) = s'(x) = (2x)\ln(x) + x^2\left(\frac{1}{x}\right) = 2x\ln(x) + x.$$

The acceleration function is

$$a(x) = v'(x) = 2\ln(x) + 2x\left(\frac{1}{x}\right) + 1 = 2\ln(x) + 3.$$

(6$^{\text{pts}}$)   **4.** Find each of the following derivatives:

$$\frac{d}{dx}(5\log_{10}(x)) = \frac{5}{x\ln(10)}$$

$$\frac{d}{dx}(6^x) = 6^x\ln(6)$$

$$\frac{d}{dx}(\pi^x) = \pi^x\ln(\pi)$$