UNIT TEST **Lessons 8-14** (100 points possible)

I. Find the derivative of each of the following functions with respect to x. (8 points each)

1. $y = 10x^3 - 4x^2 + 7$

2. $y = [\sin(5x)]^3$

3. $y = e^{4x} + \sec(4x)$

4. $y = \dfrac{e^{2x}}{\ln(2x)}$

5. $2x + 3y = xy$

II. Using the definition of the derivative, find the derivative with respect to x of $y = \dfrac{2}{x}$. (10 points)

III. Evaluate the following limits. (6 points each)

1. $\lim_{x\to\infty} 3x^{-1} =$

2. $\lim_{x\to\infty} \frac{x^2-4}{3x^2+1} =$

3. $\lim_{x\to\frac{\pi}{2}} \frac{2(\csc(x)+\cot(x))}{1+\cos(x)} =$

4. $\lim_{x\to 4} \frac{x-4}{\sqrt{x}-2} =$

IV. Find the vertical and horizontal asymptotes for the following equation. (6 points)

$$f(x) = \frac{x^2+3x+2}{x^2-x-6}$$

V. Find $\frac{dy}{dx}$ using the Chain Rule. Let $y = 3u^2$, $u = -2t$, and $t = x + 1$. (5 points)

VI. Find all values where $f''(x) = 0$ if $f(x) = x^6 - 5x^4 - 3$. (5 points)

VII. Which of the following graphs are <u>not</u> differentiable at x = 0? Draw a sketch of each. (10 points)

A. $y = \sqrt{x}$

B. $y = \sqrt{|x|}$

C. $y = x$

D. $y = |x|$

E. $y = \frac{1}{x}$