Test 2A - MTH 1410

Dr. Graham-Squire, Spring 2013

Name: _____

I pledge that I have neither given nor received any unauthorized assistance on this exam.

_____

(*signature*)

DIRECTIONS

1. Show all of your work and use correct notation. A correct answer with insufficient work or incorrect notation will lose points.
2. Clearly indicate your answer by putting a box around it.
3. Cell phones, computers, and calculators are <u>not</u> allowed on this test.
4. Give all answers in exact form, not decimal form (that is, put π instead of 3.1415, $\sqrt{2}$ instead of 1.414, etc) unless otherwise stated.
5. Make sure you sign the pledge.
6. Number of questions = 8. Total Points = 80.

1. (8 points) Find the derivative of $y = x^{3/2}(x^5 - \sqrt{x} + 7x^{-3/2})$. Simplify your answer by combining like terms if necessary.

2. (8 points) Let $g(x)$ be some differentiable function. Use the limit definition of the derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

to prove that $\frac{d}{dx}(5 \cdot g(x)) = 5 \cdot g'(x)$. That is, for $f(x) = 5 \cdot g(x)$, prove that $f'(x) = 5 \cdot g'(x)$.

3. (12 points) Find $\frac{dy}{dx}$ for the equation

$$\ln(3x^2 + y) + e^{(y^2)} = 17x$$

4. (8 points) Use the quotient rule (or the chain rule) as well as the derivatives for $\sin x$ and $\cos x$ to prove the derivative rule for $y = \csc x$.

5. (12 points) Find the derivative of $f(x) = \left(\frac{\ln x}{x^2}\right)^4$. Simplify your answer, if possible.

6. (8 points) Find the derivative of $y = x \tan\left(\frac{1}{x}\right)$. You do not need to simplify your answer.

7. (12 points) Find the derivative of

$$f(x) = (\arctan x)\left(\frac{e^x}{\csc x}\right).$$

You do not need to simplify your answer.

8. (12 points) Find an equation for the tangent line to the curve $y = \sin^3(2x)$ at $x = \dfrac{\pi}{6}$.

Extra Credit(2 points) Describe what derivative rules, and in what order, you would use to find the derivative of

$$\left(\frac{\cos x \ln x}{\tan^4(7x)}\right)^3 \cdot e^x$$