MATH 220 **Test 1** **Fall 2010**

Name ______________________________________

(circle your TA discussion section)

- ▷ **BD1**, MW 11:00-12:50, Noel DeJarnette
- ▷ **BD2**, TR 9:00-9:50, Kyle Knee
- ▷ **BD3**, TR 10:00-10:50, Scott Tichenor
- ▷ **BD4**, TR 2:00-2:50, Dan Schultz
- ▷ **BD5**, TR 11:00-11:50, Scott Tichenor
- ▷ **BD7**, MW 1:00-2:50, Scott Wetter
- ▷ **BD8**, TR 12:00-12:50, Hong Liu
- ▷ **BD9**, TR 1:00-1:50, Dan Schultz
- ▷ **DD1**, TR 11:00-11:50, Sarah Son
- ▷ **DD2**, TR 10:00-10:50, Sarah Son
- ▷ **DD4**, TR 12:00-12:50, Donghoon Jang
- ▷ **DD5**, TR 1:00-1:50, Donghoon Jang
- ▷ **DD6**, MW 1:00-2:50, Jesse Beder
- ▷ **DD7**, TR 8:00-8:50, Mu-Tsun Tsai
- ▷ **DD8**, MW 9:00-10:50, Joseph Vandehey
- ▷ **DD9**, TR 9:00-9:50, Mu-Tsun Tsai
- ▷ **AD1**, TR 11:00-11:50, Stephen Longfield
- ▷ **AD2**, TR 2:00-2:50, Lisa Hickok
- ▷ **AD3**, TR 1:00-1:50, Stephen Longfield
- ▷ **AD6**, TR 9:00-9:50, Lisa Hickok
- ▷ **AD7**, TR 3:00-3:50, Sarah Yeakel
- ▷ **AD8**, TR 4:00-4:50, Daniel Hockensmith

- Sit in your assigned seat (shown below).
- Do not open this test booklet until I say *START*.
- Turn off all electronic devices and put away all items except a pen/pencil and an eraser.
- You must show sufficient work to justify each answer.
- While the test is in progress, we will not answer questions concerning the test material.
- Quit working and close this test booklet when I say *STOP*.
- Quickly turn in your test to me or a TA and show your Student ID.

263	264	265	266	267	268	269	270	•	271	272	273					278	279	•	280	281	282	283	284	285	286	287
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FRONT OF ROOM – 314 Altgeld Hall

1. (12 points) Given that $f(x) = 2x^3 + 5$, find a formula for $f^{-1}(x)$.

2. (12 points) Suppose $f(x) = 2 - \ln x$ and $g(x) = \sqrt{x}$. Determine a formula and find the domain for $(g \circ f)(x)$.

3. (9 points) Which one of the following equations must hold in order for a function f to be continuous at a number a ?

   (a) $\lim_{x \to 0} f(x) = a$
   (b) $\lim_{x \to 0} f(x) = 0$
   (c) $\lim_{x \to 0} f(x) = f(a)$
   (d) $\lim_{x \to 0} f(x) = f'(a)$
   (e) $\lim_{x \to a} f(x) = a$
   (f) $\lim_{x \to a} f(x) = 0$
   (g) $\lim_{x \to a} f(x) = f(a)$
   (h) $\lim_{x \to a} f(x) = f'(a)$
   (i) $\lim_{x \to \infty} f(x) = a$
   (j) $\lim_{x \to \infty} f(x) = 0$
   (k) $\lim_{x \to \infty} f(x) = f(a)$
   (l) $\lim_{x \to \infty} f(x) = f'(a)$

4. (6 points) Given a function $f(x)$ for which $\lim_{h \to 0} \dfrac{f(-5+h) - f(-5)}{h}$ exists, which one of the following statements must be true?

   (a) f is continuous but not differentiable at $x = -5$.
   (b) f is differentiable but not continuous at $x = -5$.
   (c) f is both differentiable and continuous $x = -5$.
   (d) f is neither continuous nor differentiable at $x = -5$.
   (e) f is continuous but not differentiable at $x = 0$.
   (f) f is differentiable but not continuous at $x = 0$.
   (g) f is both differentiable and continuous $x = 0$.
   (h) f is neither continuous nor differentiable at $x = 0$.
   (i) f is continuous but not differentiable at $x = 5$.
   (j) f is differentiable but not continuous at $x = 5$.
   (k) f is both differentiable and continuous $x = 5$.
   (l) f is neither continuous nor differentiable at $x = 5$.

5. (12 points) Let $f(x) = x^3 - 5x$. Use the definition of a derivative as a limit to show that $f'(x) = 3x^2 - 5$. Show each step in your calculation and be sure to use proper terminology.

6. (6 points) For a given angle θ, it is known that $\cos\theta \approx 0.927$, $\sin\theta \approx 0.375$ and $\tan\theta \approx 0.404$. What is the value of $\cos\left(\frac{\pi}{2} + \theta\right)$?

7. (6 points) Evaluate and simplify $\tan\left(\cos^{-1}(2/3)\right)$.

8. (7 points) Determine real numbers a and b so that the expression $8\csc^2\theta - 5\cot^2\theta$ can be rewritten as $a\csc^2\theta + b$.

9. (5 points each) Evaluate the following limits and simplify each answer. An answer of 'does not exist' is not sufficient. If the limit is infinite then you must state if it is ∞ or $-\infty$.

(a) $\displaystyle\lim_{x\to 0} \frac{2}{e^x + 3}$

(b) $\displaystyle\lim_{x\to 2^+} \left(1000 + 5\ln(x-2)\right)$

(c) $\displaystyle\lim_{x\to 3/2} \frac{4x^2 - 9}{2x - 3}$

(d) $\lim_{x \to 2^-} \frac{5 - 3x}{x - 2}$

(e) $\lim_{x \to \infty} \frac{(2x + 1)^2}{(3x + 1)^2}$

(f) $\lim_{x \to 5} \left(\frac{1}{x - 5} - \frac{10}{x^2 - 25} \right)$

Students – do not write on this page!

1 (12 points) ____________________

2 (12 points) ____________________

3 (9 points) ____________________

4 (6 points) ____________________

5 (12 points) ____________________

6 (6 points) ____________________

7 (6 points) ____________________

8 (7 points) ____________________

9a (5 points) ____________________

9b (5 points) ____________________

9c (5 points) ____________________

9d (5 points) ____________________

9e (5 points) ____________________

9f (5 points) ____________________

TOTAL (100 points) ____________