MATH 220   **Test 1**   **Spring 2014**

Name _____   **NetID** _____

- Sit in your assigned seat (circled below).
- Circle your TA discussion section.
- 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.
- Remove hats and sunglasses.
- You must show sufficient work to justify each answer.
- While the test is in progress, we will not answer questions concerning the test material.
- Do not leave early unless you are at the end of a row.
- 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.

▷ **AD1**, TR 9:00-10:50, Darlayne Addabbo   ▷ **ADH**, TR 3:00-3:50, Paulina Koutsaki
▷ **AD2**, TR 1:00-2:50, Ben Fulan   ▷ **ADJ**, TR 9:00-9:50, Jed Chou
▷ **ADA**, TR 8:00-8:50, Chris Bailey   ▷ **ADK**, TR 10:00-10:50, Jed Chou
▷ **ADB**, TR 9:00-9:50, Chris Bailey   ▷ **ADL**, TR 11:00-11:50, Andrew McConvey
▷ **ADC**, TR 10:00-10:50, Andrew McConvey   ▷ **ADM**, TR 12:00-12:50, Benjamin Wright
▷ **ADD**, TR 11:00-11:50, Diaa Taha   ▷ **ADN**, TR 1:00-1:50, Benjamin Wright
▷ **ADE**, TR 12:00-12:50, Paul Spiegelhalter   ▷ **ADO**, TR 2:00-2:50, Paul Spiegelhalter
▷ **ADF**, TR 1:00-1:50, Diaa Taha   ▷ **ADP**, TR 3:00-3:50, Wan-Yu Wu
▷ **ADG**, TR 2:00-2:50, Paulina Koutsaki   ▷ **ADQ**, TR 4:00-4:50, Wan-Yu Wu

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14	12	10	8	6	4	2																1	3	5	7	9	11	13
10	8	6	4	2	M	M																M	M	1	3	5	7	9
10	8	6	4	2	L	L	◇		◇		◇					◇		◇		◇		L	L	1	3	5	7	9
	8	6	4	2	K	K	101	102	103	104	105	106	107	108	109	110	111					K	K	1	3	5	7	
	8	6	4	2	J	J	101	102	103	104	105	106	107	108	109	110	111					J	J	1	3	5	7	
10	8	6	4	2	I	I	101	102	103	104	105	106	107	108	109	110	111					I	I	1	3	5	7	9
10	8	6	4	2	H	H	101	102	103	104	105	106	107	108	109	110	111					H	H	1	3	5	7	9
10	8	6	4	2	G	G	101	102	103	104	105	106	107	108	109	110	111					G	G	1	3	5	7	9
	8	6	4	2	F	F	101	102	103	104	105	106	107	108	109	110	111					F	F	1	3	5	7	
	8	6	4	2	E	E	101	102	103	104	105	106	107	108	109	110	111					E	E	1	3	5	7	
10	8	6	4	2	D	D	101	102	103	104	105	106	107	108	109	110	111					D	D	1	3	5	7	9
10	8	6	4	2	C	C	101	102	103	104	105	106	107	108	109	110	111					C	C	1	3	5	7	9
10	8	6	4	2	B	B	101	102	103	104				108	109	110	111					B	B	1	3	5	7	9
			4	2	A	A	101	102	103	104				108	109	110	111					A	A	1	3			

FRONT OF ROOM – 100 Gregory Hall

1. (10 points) Circle **true** if the given statement is always true. Otherwise circle **false**.

   (a) If $v(t)$ is an even function and $w(t)$ is an odd function, then $p(t) = v(t)w(t)$ is an odd function.

   true or **false** ?

   (b) Given a function $g(x)$, if the finite limit $\lim\limits_{x \to 9} \dfrac{g(x) - g(9)}{x - 9}$ exists then $g(x)$ is continuous at 9.

   true or **false** ?

   (c) If a function $h(x)$ is not defined at $x = a$, then $\lim\limits_{x \to a} h(x)$ does not exist.

   true or **false** ?

   (d) If a function $f(x)$ is one-to-one then $f(1) = 1$.

   true or **false** ?

   (e) A function which is continuous at a point a must also be differentiable at a.

   true or **false** ?

2. (10 points) Let $g(x) = x^3 + 8x - 10$.

Use the definition of a derivative as a limit to prove that $g'(x) = 3x^2 + 8$.

Show each step in your calculation and be sure to use proper terminology in each step of your proof.

3. (5 points each) For a given acute angle θ, it is known that $\sec \theta = 8/3$. Evaluate the following quantities.

   (a) $\sin(\theta)$

   (b) $\cos(\pi + \theta)$

   (c) $\cos(2\theta)$

4. (5 points each) Evaluate the following quantities.

   (a) $2\sin\left(\dfrac{\pi}{8}\right)\cos\left(\dfrac{\pi}{8}\right)$

   (b) $\cot(\arcsin(7/8))$

5. (10 points) The function $f(x) = \sqrt[3]{\ln\left(\arctan\left(e^x\right)\right)}$ is one-to-one on its domain. Determine a formula for its inverse $f^{-1}(x)$.

6. (10 points) Determine the domain of the function $f(x) = \dfrac{\left(x^2 - 144\right)e^{x-3}}{\ln\left(37 - x^2\right) - 2\ln\left(x\right)}$

7. (10 points) Find all horizontal asymptotes on the graph of $f(x) = \dfrac{42 + 2e^{12x}}{9e^{4x} + 6}$

8. (5 points each) Evaluate the following limits without the use of derivatives. Show sufficient justification for each answer. An answer of 'does not exist' is not sufficient. For infinite limits you must state if it is ∞ or $-\infty$.

(a) $\displaystyle \lim_{x \to 0} \frac{e^{2x}}{5x + 8}$

(b) $\displaystyle \lim_{x \to \infty} \frac{3x^8 + 6x^5 - 100}{16 + 2x^8}$

(c) $\displaystyle\lim_{x\to 0} \frac{19x - 5\sin x}{2x}$

(d) $\displaystyle\lim_{x\to 0} \frac{e^{6x} - 1}{e^{3x} - 1}$

(e) $\displaystyle\lim_{x\to\infty} \frac{5e^{-2x} + 4}{\ln\left(1 - \dfrac{3}{x^2 + 1}\right)}$

Students – do not write on this page!

1. (10 points) _____

2. (10 points) _____

3a. (5 points) _____

3b. (5 points) _____

3c. (5 points) _____

4a. (5 points) _____

4b. (5 points) _____

5. (10 points) _____

6. (10 points) _____

7. (10 points) _____

8a. (5 points) _____

8b. (5 points) _____

8c. (5 points) _____

8d. (5 points) _____

8e. (5 points) _____

TOTAL (100 points) _____