AL2 (MWF 9:00-9:50) AL1 (MWF 12:00-12:50) AL3 (MWF 1:00-1:50)

MATH 220 **Test 1** **Fall 2016**

Name _____ **NetID** _____

UIN _____

- 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 11:00-12:50, Andrew McConvey
- ▷ **AD2**, TR 9:00-10:50, Ben Wright
- ▷ **AD3**, TR 1:00-2:50, Cassie Christenson
- ▷ **ADA**, TR 8:00-8:50, Alexi Block Gorman
- ▷ **ADB**, TR 9:00-9:50, Dakota Ihli
- ▷ **ADC**, TR 10:00-10:50, Elizabeth Field
- ▷ **ADD**, TR 11:00-11:50, Adam Wagner
- ▷ **ADE**, TR 12:00-12:50, Adam Wagner
- ▷ **ADF**, TR 1:00-1:50, Tsutomu Okano
- ▷ **ADG**, TR 2:00-2:50, Xujun 'Henry' Liu
- ▷ **ADH**, TR 3:00-3:50, Mychael Sanchez
- ▷ **ADI**, TR 4:00-4:50, Mychael Sanchez
- ▷ **ADJ**, TR 9:00-9:50, Kyle Pratt
- ▷ **ADK**, TR 10:00-10:50, Kyle Pratt
- ▷ **ADL**, TR 11:00-11:50, Tigran Hakobyan
- ▷ **ADM**, TR 12:00-12:50, Liz Tatum
- ▷ **ADN**, TR 1:00-1:50, Xujun 'Henry' Liu
- ▷ **ADO**, TR 2:00-2:50, Tigran Hakoybyan
- ▷ **ADP**, TR 3:00-3:50, Liz Tatum
- ▷ **ADQ**, TR 10:00-10:50, Dakota Ihli
- ▷ **ADR**, TR 9:00-9:50, Elizabeth Field
- ▷ **ADS**, TR 12:00-12:50, Tsutomu Okano
- ▷ **ADT**, TR 2:00-2:50, Anna Weigandt
- ▷ **ADU**, TR 3:00-3:50, Anna Weigandt

	◇	◇	◇	◇																	
	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9			R1	R2	R3		
	P1	P2	P3	P4		P1	P2	P3	P4	P5	P6	P7	P8	P9			Q1	Q2	Q3	Q4	
N1	N2	N3	N4	N5		N1	N2	N3	N4	N5	N6	N7	N8	N9	N10		P1	P2	P3	P4	P5
M1	M2	M3	M4	M5		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10		N1	N2	N3	N4	N5
L1	L2	L3	L4	L5		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10		M1	M2	M3	M4	M5
K1	K2	K3	K4	K5		K1	K2	K3	K4	K5	K6	K7	K8	K9	K10		L1	L2	L3	L4	L5
J1	J2	J3	J4	J5		J1	J2	J3	J4	J5	J6	J7	J8	J9	J10		K1	K2	K3	K4	K5
H1	H2	H3	H4	H5		H1	H2	H3	H4	H5	H6	H7	H8	H9	H10		J1	J2	J3	J4	J5
G1	G2	G3	G4	G5		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10		H1	H2	H3	H4	H5
F1	F2	F3	F4	F5		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10		G1	G2	G3	G4	G5
E1	E2	E3	E4	E5		E1	E2	E3	E4	E5	E6	E7	E8	E9	E10		F1	F2	F3	F4	F5
D1	D2	D3	D4	D5		D1	D2	D3	D4	D5	D6	D7	D8	D9	D10		E1	E2	E3	E4	E5
C1	C2	C3	C4	C5		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10		D1	D2	D3	D4	D5
B1	B2	B3	B4	B5		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10		C1	C2	C3	C4	C5
A1	◇	◇	◇	◇													B1	B2	B3	B4	B5
																	◇	◇	◇	◇	A5

FRONT OF ROOM – 114 David Kinley 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 $\lim_{x \to 9} \dfrac{g(x) - g(9)}{x - 9}$ exists then $g(x)$ is continuous at 9.

   true or **false** ?

   (c) If a function $h(x)$ is not defined at $x = a$, then $\lim_{x \to a} h(x)$ 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) $2\sin\left(\frac{\pi}{8}\right)\cos\left(\frac{\pi}{8}\right)$

   (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) $\lim\limits_{x \to 0} \dfrac{e^{2x}}{5x + 8}$

   (b) $\lim\limits_{x \to \infty} \dfrac{3x^8 + 6x^5 - 100}{16 + 2x^8}$

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

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

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

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) _____