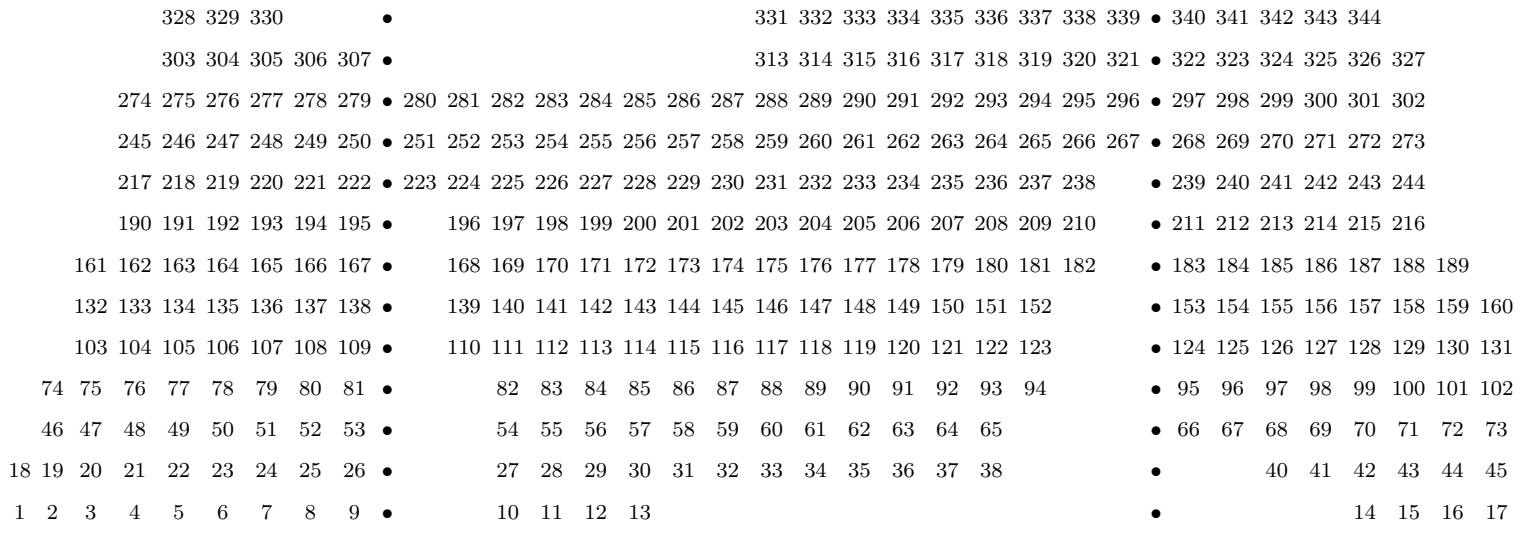
MATH 220 **Test 1** **Fall 2012**

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 11:00-12:50, Hannah Kolb Spinoza
▷ **AD2**, TR 9:00-10:50, Ki Yeun Kim
▷ **AD3**, TR 1:00-2:50, Michael Santana
▷ **ADA**, TR 8:00-8:50, Ziying Pan
▷ **ADB**, TR 9:00-9:50, Ziying Pan
▷ **ADC**, TR 10:00-10:50, Lisa Hickok
▷ **ADD**, TR 11:00-11:50, Lisa Hickok
▷ **ADE**, TR 12:00-12:50, Andrew McConvey
▷ **ADF**, TR 1:00-1:50, Jian Liang
▷ **ADG**, TR 2:00-2:50, Derrek Yager
▷ **ADH**, TR 3:00-3:50, Lechao Xiao
▷ **ADI**, TR 4:00-4:50, Lechao Xiao
▷ **ADJ**, TR 9:00-9:50, Meghan Galiardi
▷ **ADK**, TR 10:00-10:50, Meghan Galiardi
▷ **ADL**, TR 11:00-11:50, Andrew McConvey
▷ **ADM**, TR 12:00-12:50, Benjamin Fulan
▷ **ADN**, TR 1:00-1:50, Benjamin Fulan
▷ **ADO**, TR 2:00-2:50, Jian Liang
▷ **ADP**, TR 3:00-3:50, Hongfei Tian
▷ **ADQ**, TR 4:00-4:50, Hongfei Tian
▷ **ADR**, TR 9:00-9:50, Noah Chartoff
▷ **ADS**, TR 12:00-12:50, Derrek Yager
▷ **ADT**, TR 2:00-2:50, Anna Weigandt
▷ **ADU**, TR 3:00-3:50, Anna Weigandt



FRONT OF ROOM – 228 Natural History Building

1. (5 points) If the point $(5, -3)$ is on the graph of a one-to-one function f, then which one of the following points must be on the graph of $y = f^{-1}(x)$?

   (a) $(3, 5)$

   (b) $(3, -5)$

   (c) $(-3, 5)$

   (d) $(-3, -5)$

   (e) $(5, 3)$

   (f) $(-5, 3)$

   (g) $(-5, -3)$

2. (5 points) Which one of the following statements is true?

   (a) A function which is continuous at a point a must be continuous at all other points in the domain of the function.

   (b) A function which is continuous at all points in its domain must be one-to-one.

   (c) A function which is one-to-one must be increasing on its domain.

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

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

   (f) A function which is differentiable at a point a must be differentiable at all other points in the domain of the function.

3. (10 points) Let $f(x) = 6x - 4x^2$.

   Use the definition of a derivative as a limit to prove that $f'(x) = 6 - 8x$.

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

4. (10 points) Determine a formula for an exponential function which goes through the point $(2, 3)$ and has a y-intercept of 8.

5. (10 points) What is the value of $\sin\left(\tan^{-1}(4)\right)$?

6. (10 points) Given that $0 < \theta < \pi/2$, and $\sin\theta = 1/3$, evaluate $\cos(\pi - \theta)$.

7. (10 points) Determine a formula for $f^{-1}(x)$ given that $f(x) = \dfrac{1 - e^x}{2 + 3e^x}$

8. (10 points) Solve for x in the equation below.

$$e^{2+\ln(x+2)} = 15e^{2-\ln x}$$

9. (10 points) Find all horizontal asymptotes on the graph of $f(x) = \dfrac{8 - 3e^x}{4e^x + 2}$

10. (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) $\lim_{x \to 0} \dfrac{6 + 2e^x}{7 - 5\cos x}$

(b) $\lim_{x \to \infty} \dfrac{8 \sin x}{3x}$

(c) $\lim_{x \to 2^-} \dfrac{x^2 - 2x}{x^2 - 4x + 4}$

(d) $\lim_{x \to 2} \dfrac{\frac{1}{2} - \frac{1}{x}}{x^2 - 4}$

Students – do not write on this page!

1. (5 points) _____

2. (5 points) _____

3. (10 points) _____

4. (10 points) _____

5. (10 points) _____

6. (10 points) _____

7. (10 points) _____

8. (10 points) _____

9. (10 points) _____

10a. (5 points) _____

10b. (5 points) _____

10c. (5 points) _____

10d. (5 points) _____

TOTAL (100 points) _____