MATH 220  Test 1  Fall 2015

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, Derek Jung | ADJ, TR 9:00-9:50, Elizabeth Field |
| AD2, TR 9:00-10:50, Claire Merriman | ADK, TR 10:00-10:50, Elizabeth Field |
| AD3, TR 1:00-2:50, Itziar Ochoa de Alaiza Gracia | ADL, TR 11:00-11:50, Emily Heath |
| ADA, TR 8:00-8:50, Dara Zirlin | ADM, TR 12:00-12:50, Alyssa Loving |
| ADB, TR 9:00-9:50, Dara Zirlin | ADN, TR 1:00-1:50, Aaron Schneberger |
| ADC, TR 10:00-10:50, Xujun Liu | ADO, TR 2:00-2:50, Tigran Hakobyan |
| ADD, TR 11:00-11:50, Christopher Linden | ADP, TR 3:00-3:50, Tigran Hakobyan |
| ADE, TR 12:00-12:50, Christopher Linden |ADR, TR 9:00-9:50, Xujun Liu |
| ADF, TR 1:00-1:50, Alyssa Loving | ADS, TR 12:00-12:50, Emily Heath |
| ADG, TR 2:00-2:50, Xianchang Meng | ADT, TR 2:00-2:50, Argen West |
| ADH, TR 3:00-3:50, Xianchang Meng | ADU, TR 3:00-3:50, Argen West |
| ADI, TR 4:00-4:50, Aaron Schneberger |  

FRONT OF ROOM – 114 David Kinley Hall
1. (25 points) Circle true if the given statement is always true. Otherwise circle false.

(a) The function \( y = \frac{2x^2 - 242}{x + 11} \) has a vertical asymptote at \( x = -11 \).

true or false?

(b) If \( \alpha(t) \) and \( \beta(t) \) are both odd functions, then \( \gamma(t) = \alpha(t)\beta(t) \) is an even function.

true or false?

(c) A function which is continuous at a number \( a \) must also be differentiable at \( a \).

true or false?

(d) If the finite limit \( \lim_{s \to 10} \frac{w(s) - w(10)}{s - 10} \) exists, then the function \( w \) is continuous at 10.

true or false?

(e) If a function \( g(r) \) is not defined at \( r = b \), then \( \lim_{r \to b} g(r) \) does not exist.

true or false?
2. (10 points) Let \( g(x) = 42x - 13x^2 \).

Use the definition of a derivative as a limit to prove that \( g'(x) = 42 - 26x \).

Show each step in your calculation and be sure to use proper terminology in each step of your proof.
3. (10 points) The graphs of \( f(x) = \ln(6) + 5 \ln(-x) \) and \( g(x) = \ln(-150x^3) \) intersect. Determine the \( x \)-value for each point of intersection. Simplify your answer.

4. (10 points) What is the domain of the function \( \frac{\ln(18 - x)}{\sqrt{20 - x - \sqrt{x - 6}}} \)?
5. (5 points each) Evaluate the following quantities and simplify your answers.

(a) \(\csc(\arctan(12))\)

(b) \(\ln\left(\frac{56}{e^{18}}\right) + \ln\left(\frac{e^6}{8}\right) + 12\)

(c) \(9 \cos\left(\frac{2\pi}{17}\right) + 18 \sin^2\left(\frac{\pi}{17}\right)\)
6. (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 $\infty$ or $-\infty$.

(a) \( \lim_{x \to 8/7} \frac{49x^2 - 64}{7x - 8} \)

(b) \( \lim_{x \to \infty} \frac{6x^{12}(5x + 3)^2}{2 + 15x^{14}} \)

(c) \( \lim_{x \to 0} \frac{\sqrt{x^2 + 169} - 13}{5x^2} \)
(d) \[ \lim_{x \to -\infty} \frac{8 + 4/x}{7e^x} \]

(e) \[ \lim_{x \to 5^+} (14 \ln (x^2 - 25) + 8e^{x-5}) \]

(f) \[ \lim_{x \to \infty} \frac{\sin x}{x} \]
1. (25 points) ___________________ 
2. (10 points) ___________________ 
3. (10 points) ___________________ 
4. (10 points) ___________________ 
5a. (5 points) ___________________ 
5b. (5 points) ___________________ 
5c. (5 points) ___________________ 
6a. (5 points) ___________________ 
6b. (5 points) ___________________ 
6c. (5 points) ___________________ 
6d. (5 points) ___________________ 
6e. (5 points) ___________________ 
6f. (5 points) ___________________ 

TOTAL (100 points) _______________