MATH 220 Test 1 Spring 2019

Name ________________________________ NetID ________________
UIN ________________

Circle your TA discussion section.

- AD1, TR 9:00-10:50, Ran Ji
- AD2, TR 1:00-2:50, Cassie Christenson
- AD3, TR 11:00-12:50, Dana Neidinger
- ADA, TR 8:00-8:50, Eion Blanchard
- ADB, TR 9:00-9:50, Eion Blanchard
- ADC, TR 10:00-10:50, Yuxuan "Yuki" Zhang
- ADD, TR 11:00-11:50, Stathis Chrontsios
- ADE, TR 12:00-12:50, Kesav Krishnan
- ADF, TR 1:00-1:50, Souktik Roy
- ADG, TR 2:00-2:50, Gidon Orelowitz
- ADH, TR 3:00-3:50, Mina Nahvi
- ADJ, TR 9:00-9:50, Yuxuan "Yuki" Zhang
- ADK, TR 10:00-10:50, Souktik Roy
- ADL, TR 11:00-11:50, Gidon Orelowitz
- ADM, TR 12:00-12:50, Vincent Villalobos
- ADN, TR 1:00-1:50, Kesav Krishnan
- ADP, TR 2:00-2:50, Stathis Chrontsios
- ADO, TR 4:00-4:50, Mina Nahvi
- ADQ, TR 4:00-4:50, Mina Nahvi
- ADR, TR 10:00-10:50, Vincent Villalobos

- Sit in your assigned seat (circled below).
- Do not open the test or write formulas upon it until I say START.
- Remove smartwatches and turn off all electronic devices.
- Put away all items except a pen/pencil and an eraser.
- Remove hats and sunglasses.
- There is no partial credit on multiple-choice questions. For all other questions, you must show sufficient work to justify your 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.

FRONT OF ROOM – 141 Wohlers Hall
1. (8 points each) Evaluate the following limits and write your answers in simplified form. For infinite limits, you must clearly show whether the limit is $\infty$ or $-\infty$. We will learn l’Hospital’s Rule and other shortcuts for obtaining limits later. For now you are not allowed to use these approaches.

(a) \[ \lim_{x \to 6^+} \frac{\cos (5\pi/x)}{\ln (7 - x)} \]

(b) \[ \lim_{x \to -\infty} \frac{10 \arctan(8x) + 19\pi}{18 \arctan(4x) + 16\pi} \]
2. (6 points) Simplify the following quantity.

\[ 3e^{5\ln(2)} + \ln(9e^{10}) - \ln(9e^2) \]
3. (10 points) Suppose that \( w(x) \) is odd, one-to-one, and its graph goes through the point \((-3, 1/8)\).

(a) Determine another point which must be on the graph of \( w(x) \).

(b) Determine a point which must be on the graph of \( w^{-1}(x) \).

4. (10 points) For a given acute angle \( \theta \), it is known that \( \sec(\theta) = 5 \). Evaluate the following quantities.

(a) \( \cos(2\theta) \)

(b) \( \cos(\pi + \theta) \)
5. (10 points) Let \( f(x) = 8x^2 + 9x \).

Use the definition of a derivative as a limit to prove that \( f'(x) = 16x + 9 \).

Show each step in your calculation and be sure to use proper terminology in each step of your proof.
6. (10 points) The function $f(x) = 5e^{4x} - 50$ has derivative $f'(x) = 20e^{4x}$. Determine the equation for the line which is tangent to the graph of $f(x)$ at its $x$-intercept.

7. (10 points) The graphs of $f(x) = \ln(2) + 3\ln(-x)$ and $g(x) = \ln(-32x)$ intersect. Determine the $x$-value for each point of intersection. Simplify your answer.
8. (10 points) A bacterial culture starts with 400 bacteria and doubles in size every 2 hours.

(a) Find a formula for the number of bacteria after $t$ hours.

(b) At what time is the population equal to 2400?

9. (10 points) Use interval notation to state the domain of the given function.

$$\frac{\ln(55-x)}{\sqrt{60-x} - \sqrt{x-24}}$$
1a. (8 points) ____________________

1b. (8 points) ____________________

1c. (8 points) ____________________

2. (6 points) ____________________

3. (10 points) ____________________

4. (10 points) ____________________

5. (10 points) ____________________

6. (10 points) ____________________

7. (10 points) ____________________

8. (10 points) ____________________

9. (10 points) ____________________

TOTAL (100 points) ______________