MATH 220 **Test 2** **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
▷ **AD2**, TR 9:00-10:50, Claire Merriman
▷ **AD3**, TR 1:00-2:50, Itziar Ochoa de Alaiza Gracia
▷ **ADA**, TR 8:00-8:50, Dara Zirlin
▷ **ADB**, TR 9:00-9:50, Dara Zirlin
▷ **ADC**, TR 10:00-10:50, Xujun Liu
▷ **ADD**, TR 11:00-11:50, Christopher Linden
▷ **ADE**, TR 12:00-12:50, Christopher Linden
▷ **ADF**, TR 1:00-1:50, Alyssa Loving
▷ **ADG**, TR 2:00-2:50, Xianchang Meng
▷ **ADH**, TR 3:00-3:50, Xianchang Meng
▷ **ADI**, TR 4:00-4:50, Aaron Schneberger
▷ **ADJ**, TR 9:00-9:50, Elizabeth Field
▷ **ADK**, TR 10:00-10:50, Elizabeth Field
▷ **ADL**, TR 11:00-11:50, Emily Heath
▷ **ADM**, TR 12:00-12:50, Alyssa Loving
▷ **ADN**, TR 1:00-1:50, Aaron Schneberger
▷ **ADO**, TR 2:00-2:50, Tigran Hakobyan
▷ **ADP**, TR 3:00-3:50, Tigran Hakobyan
▷ **ADR**, TR 9:00-9:50, Xujun Liu
▷ **ADS**, TR 12:00-12:50, Emily Heath
▷ **ADT**, TR 2:00-2:50, Argen West
▷ **ADU**, TR 3:00-3:50, Argen West

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FRONT OF ROOM – 100 Materials Science and Engineering Building

1. (8 points) Find $g'(t)$ given that $g(t) = 80t^7 - 21t^4 + 18t - \arcsin(1/8)$

2. (8 points) Find $\dfrac{dv}{dt}$ given that $v = 6t^4 \arctan(12t)$

3. (8 points) Find $f'(x)$ given that $f(x) = \left(\dfrac{x^9 + 22}{\ln(x)}\right)^8$

4. (8 points) Find $h'(t)$ given that $h(t) = \cos\left(e^{10t}\right)$

5. (8 points) Find the slope of the line tangent to the curve $x^4y^2 = 75x - 2y$ at the point $(2, 3)$.

6. (10 points) A circle is increasing in size so that its circumference increases at the rate of 5 centimeters per minute. At what rate is the circle's area increasing when the diameter is 42 centimeters?

7. (10 points) The curve $y = f(x)$ has the property that the slope of the curve is always equal to its y-coordinate multiplied by $1/4$. If the curve goes through the point $(\ln(81), 36)$, then find a formula for $f(x)$. Simplify your answer.

8. (10 points) Determine the x-coordinate of the lowest point on the graph of the following function.

$$f(x) = 2\ln\left(64x^2 + 1\right) - 320\arctan(8x)$$

9. (10 points) Evaluate the following limit. Simplify your answer.

$$\lim_{x \to \infty} \frac{12 \sin(8/x)}{4e^{(1/x)} - 4}$$

10. (10 points) A function $f(x)$ is continuous at each real number and it has the following first derivative.

$$f'(x) = 82 (\arctan(x) + 2\pi) (e^x + 42) \left(x^2 - 49\right) \left(x^2 + 144\right) (x - 10)^8$$

(a) State each interval upon which the graph of $f(x)$ is increasing.

(b) State each interval upon which the graph of $f(x)$ is decreasing.

11. (10 points) What is the largest possible area for a rectangle which satisfies all of the following conditions?

- The rectangle's bottom left corner is at the origin.
- The rectangle's top right corner lies on the curve $y = \dfrac{182}{x^2 + 49}$ for $x > 0$.
- The rectangle's bottom side lies on the x-axis.

Students – do not write on this page!

1. (8 points) _____
2. (8 points) _____
3. (8 points) _____
4. (8 points) _____
5. (8 points) _____
6. (10 points) _____
7. (10 points) _____
8. (10 points) _____
9. (10 points) _____
10. (10 points) _____
11. (10 points) _____

TOTAL (100 points) _____