MATH 220 **Test 2** **Fall 2013**

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, Sarah Loeb / Hannah Spinoza
- ▷ **AD2**, TR 9:00-10:50, M.Tip Phaovibul
- ▷ **AD3**, TR 1:00-2:50, Cara Monical
- ▷ **ADA**, TR 8:00-8:50, Nima Rasekh
- ▷ **ADB**, TR 9:00-9:50, Hong Liu
- ▷ **ADC**, TR 10:00-10:50, Hong Liu
- ▷ **ADD**, TR 11:00-11:50, Stephen Berning
- ▷ **ADE**, TR 12:00-12:50, Stephen Berning
- ▷ **ADF**, TR 1:00-1:50, Christopher Bailey
- ▷ **ADG**, TR 2:00-2:50, Christopher Bailey
- ▷ **ADH**, TR 3:00-3:50, Neriman Tokcan
- ▷ **ADI**, TR 4:00-4:50, Neriman Tokcan
- ▷ **ADJ**, TR 9:00-9:50, Nima Rasekh
- ▷ **ADK**, TR 10:00-10:50, Michael Obiero Oyengo
- ▷ **ADL**, TR 11:00-11:50, Andrew McConvey
- ▷ **ADM**, TR 12:00-12:50, Benjamin Wright
- ▷ **ADN**, TR 1:00-1:50, Benjamin Wright
- ▷ **ADO**, TR 2:00-2:50, Vanessa Rivera-Quiñones
- ▷ **ADP**, TR 3:00-3:50, Vanessa Rivera-Quiñones
- ▷ **ADR**, TR 9:00-9:50, Michael Santana
- ▷ **ADS**, TR 12:00-12:50, Andrew McConvey
- ▷ **ADT**, TR 2:00-2:50, Alessandro Gondolo
- ▷ **ADU**, TR 3:00-3:50, Alessandro Gondolo

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FRONT OF ROOM – 228 Natural History Building

1. (8 points) Find $g'(x)$ given that $g(x) = 4\arcsin x - 2\ln x + 8\csc x + 6\cot x$

2. (8 points) Find $h'(t)$ given that $h(t) = \sqrt[3]{4t^2 + 3\sin t}$

3. (8 points) Find $w'(x)$ given that $w(x) = \dfrac{x^{12} - 6x^5}{x^8 + 10}$

4. (8 points) Find $r'(\theta)$ given that $r(\theta) = \theta^3 e^{4\theta}$

5. (8 points) Find $v'(x)$ given that $v(x) = \cos\left(\sqrt{5 + e^{4x}}\right)$

6. (8 points) Find $\dfrac{dy}{dx}$ given that $e^{x^5 y^2} = 10xy$

7. (12 points) A polynomial $f(x)$ has the following first and second derivatives.

- $f'(x) = 18x(x+64)^3$
- $f''(x) = 72(x+16)(x+64)^2$

(a) Upon which interval is f concave up?

(b) At which x-value does f have an inflection point?

(c) Upon which interval is f decreasing?

(d) At which x-value does f have a local minimum?

8. (9 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 $y = 91e^{-7x}$ for $x > 0$.
   - The rectangle's bottom side lies on the x-axis.

9. (8 points) The volume of a sphere is increasing at a rate of $35\pi\ cm^3/sec$. How fast is the radius increasing when the diameter is 16 cm ?

10. (8 points) Suppose that A represents the number of grams of a radioactive substance at time t seconds. Given that $\frac{dA}{dt} = -0.6A$, how long does it take 25 grams of this substance to be reduced to 4 grams?

11. (5 points each) Evaluate the following limits.

(a) $\lim_{x \to \infty} \dfrac{100x^{20} + 8}{2e^{0.5x} + 9}$

(b) $\lim_{x \to 0} \dfrac{105x \cos x}{1 - e^{35x}}$

(c) $\lim_{x \to 1^+} x^{1/(x^4 - 1)}$

Students – do not write on this page!

1. (8 points) _____

2. (8 points) _____

3. (8 points) _____

4. (8 points) _____

5. (8 points) _____

6. (8 points) _____

7. (12 points) _____

8. (9 points) _____

9. (8 points) _____

10. (8 points) _____

11a. (5 points) _____

11b. (5 points) _____

11c. (5 points) _____

TOTAL (100 points) _____