MATH 220 Test 2 Spring 2014

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 9:00-10:50, Darlayne Addabbo ▷ ADH, TR 3:00-3:50, Paulina Koutsaki
▷ AD2, TR 1:00-2:50, Ben Fulan ▷ ADJ, TR 9:00-9:50, Jed Chou
▷ ADA, TR 8:00-8:50, Chris Bailey ▷ ADK, TR 10:00-10:50, Jed Chou
▷ ADB, TR 9:00-9:50, Chris Bailey ▷ ADL, TR 11:00-11:50, Andrew McConvey
▷ ADC, TR 10:00-10:50, Andrew McConvey ▷ ADM, TR 12:00-12:50, Benjamin Wright
▷ ADD, TR 11:00-11:50, Diaa Taha ▷ ADN, TR 1:00-1:50, Benjamin Wright
▷ ADE, TR 12:00-12:50, Paul Spiegelhalter ▷ADO, TR 2:00-2:50, Paul Spiegelhalter
▷ ADF, TR 1:00-1:50, Diaa Taha ▷ ADP, TR 3:00-3:50, Wan-Yu Wu
▷ ADG, TR 2:00-2:50, Paulina Koutsaki ▷ ADQ, TR 4:00-4:50, Wan-Yu Wu

FRONT OF ROOM – 100 Materials Science and Engineering Building
1. (10 points) Find $f'(x)$ given that $f(x) = \csc (7x^{13} + 8x^7 + 42)$

2. (10 points) Find $f'(x)$ given that $f(x) = x^6 e^{8x}$
3. (10 points) Find \( f'(x) \) given that \( f(x) = \ln \left( \arctan \left( x^{12} \right) \right) \)

4. (10 points) Find \( \frac{dy}{dx} \) given that \( x^5 y^4 = x^5 + y^9 \)
5. (10 points) Evaluate the following limit. You must fully justify your answer.

\[
\lim_{x \to 0} \frac{xe^{8x} - x}{1 - \cos(12x)}
\]
6. (5 points each) Circle the correct limit. There is no partial credit for this problem.

(a) \( \lim_{x \to \infty} \frac{-10 \ln x}{5 \sqrt{x}} \)

(a) -\infty  (b) -2  (c) -1  (d) 0  (e) 1  (f) 2  (g) \infty

(b) \( \lim_{x \to \infty} \frac{e^{0.04x} - 26}{13x} \)

(a) -\infty  (b) -2  (c) -1  (d) 0  (e) 1  (f) 2  (g) \infty

7. (10 points) Find the absolute maximum and minimum values of \( f(x) = \frac{\ln x}{x^{17}} \) on the interval \([1, e] \).
8. (10 points) The graph of $y = 3x^2 + 300$ lies above the graph of $y = 24x + 2$. What is the minimum vertical distance between these two graphs?
9. (10 points) A spherical balloon is being inflated so that its diameter is increasing at a constant rate of 6 $cm/min$. How quickly is the volume of the balloon increasing when the diameter is 50 $cm$?

10. (10 points) Solve the following differential equations given that the graph of each solution goes through the point $(\alpha, \theta) = (8, 3)$. You must use the given variables.

(a) $\frac{d\theta}{d\alpha} = \frac{\alpha}{8}$

(b) $\frac{d\theta}{d\alpha} = \frac{\theta}{8}$
Students – do not write on this page!

1. (10 points) __________________

2. (10 points) __________________

3. (10 points) __________________

4. (10 points) __________________

5. (10 points) __________________

6. (10 points) __________________

7. (10 points) __________________

8. (10 points) __________________

9. (10 points) __________________

10. (10 points) __________________

TOTAL (100 points) ____________