MATH 220 **Test 3** **Fall 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 11:00-12:50, Melinda Lanius
▷ **AD2**, TR 9:00-10:50, Ben Fulan
▷ **AD3**, TR 1:00-2:50, Mychael Sanchez
▷ **ADA**, TR 8:00-8:50, Derek Jung
▷ **ADB**, TR 9:00-9:50, Derek Jung
▷ **ADC**, TR 10:00-10:50, Andrew McConvey
▷ **ADD**, TR 11:00-11:50, Andrew McConvey
▷ **ADE**, TR 12:00-12:50, David Poole
▷ **ADF**, TR 1:00-1:50, Alonza Terry
▷ **ADG**, TR 2:00-2:50, Alonza Terry
▷ **ADH**, TR 3:00-3:50, Argen West
▷ **ADI**, TR 4:00-4:50, Argen West
▷ **ADJ**, TR 9:00-9:50, Vanessa Rivera-Quiñones
▷ **ADK**, TR 10:00-10:50, Vanessa Rivera-Quiñones
▷ **ADL**, TR 11:00-11:50, David Poole
▷ **ADM**, TR 12:00-12:50, Iftikhar Ahmed
▷ **ADN**, TR 1:00-1:50, Kaiwen Liu
▷ **ADO**, TR 2:00-2:50, Hannah Burson
▷ **ADP**, TR 3:00-3:50, Hannah Burson
▷ **ADR**, TR 9:00-9:50, Stephen Berning
▷ **ADS**, TR 12:00-12:50, Sarah Mousley
▷ **ADT**, TR 2:00-2:50, Kaiwen Liu
▷ **ADU**, TR 3:00-3:50, Iftikhar Ahmed

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23							
1	2	3	4	5	6	K																K		1	2	3			
1	2	3	4	5	6	J	J	1	2	3	4	5	6	7	8	9	10	11	12	13	J	J	1	2	3	4	5	6	
1	3	2	4	5	6	I	I	1	2	3	4	5	6	7	8	9	10	11	12	13	I	I	1	2	3	4	5	6	
1	2	3	4	5	6	H	H	1	2	3	4	5	6	7	8	9	10	11	12	13	H	H	1	2	3	4	5	6	
1	2	3	4	5	6	G	G	1	2	3	4	5	6	7	8	9	10	11	12	13	G	G	1	2	3	4	5	6	
1	2	3	4	5	6	F	F	1	2	3	4	5	6	7	8	9	10	11	12	13	F	F	1	2	3	4	5	6	
1	2	3	4	5	6	E	E	1	2	3	4	5	6	7	8	9	10	11	12	13	E	E	1	2	3	4	5	6	
1	2	3	4	5	6	D	D	1	2	3	4	5	6	7	8	9	10	11	12	13	D	D	1	2	3	4	5	6	
1	2	3	4	5	6	C	C	1	2	3	4	5	6	7	8	9	10	11	12	13	C	C	1	2	3	4	5	6	
1	2	3	4	5	6	B	B	1	2	3	4	5	6	7	8	9	10	11	12	13	B	B	1	2	3	4	5	6	
							A	1	2	3								1	2	3	A								

FRONT OF ROOM – 100 Materials Science and Engineering Building

1. (5 points) Fill in the missing information to show that the area between the x-axis and the graph of $f(x) = 3x + 10$ on the interval $[2, 7]$ can be expressed as the limit of a right Riemann sum. The only variables appearing in your limit should be n and k. Do not evaluate this limit.

$$AREA = \lim_{n\to\infty} \sum_{k=1}^{n} \Bigg[\qquad\qquad \Bigg]$$

2. (5 points) If Newton's Method is used to approximate a solution to the equation $f(x) = 0$, then it generates a sequence of approximations $x_1, x_2, x_3, x_4, \ldots$. Which one of the following correctly shows how x_n can be used to determine the next approximation x_{n+1} ?

(a) $x_{n+1} = \dfrac{x_n + f'(x_n)}{f(x_n)}$

(b) $x_{n+1} = x_n + \dfrac{f'(x_n)}{f(x_n)}$

(c) $x_{n+1} = \dfrac{x_n + f(x_n)}{f'(x_n)}$

(d) $x_{n+1} = x_n + \dfrac{f(x_n)}{f'(x_n)}$

(e) $x_{n+1} = \dfrac{x_n - f'(x_n)}{f(x_n)}$

(f) $x_{n+1} = x_n - \dfrac{f'(x_n)}{f(x_n)}$

(g) $x_{n+1} = \dfrac{x_n - f(x_n)}{f'(x_n)}$

(h) $x_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)}$

3. (10 points) Evaluate the following indefinite integrals.

(a) $\displaystyle\int \sin x \, dx$

(b) $\displaystyle\int \cos x \, dx$

(c) $\displaystyle\int e^x \, dx$

(d) $\displaystyle\int \frac{1}{x} \, dx$

(e) $\displaystyle\int \sec^2 x \, dx$

(f) $\displaystyle\int \csc^2 x \, dx$

(g) $\displaystyle\int \csc x \cot x \, dx$

(h) $\displaystyle\int \sec x \tan x \, dx$

(i) $\displaystyle\int \frac{1}{1 + x^2} \, dx$

(j) $\displaystyle\int \frac{1}{\sqrt{1 - x^2}} \, dx$

4. (10 points) Let $g(x) = \int_{-19}^{x^2} (t-169)^{92} (5t-245)^{37} \, dt$. Determine the x-value for each local minimum on the graph of $g(x)$.

5. (10 points) At 4:00 AM, the layer of ice on Lake Mendota has a thickness of 7 inches. Its thickness is increasing at a rate of $t/4$ inches per hour where t represents the number of hours since 4:00 AM. What is the thickness of the ice at 9:00 AM that same day? Write your answer in decimal form.

6. (10 points) Let $\mathbf{R}$ be the finite region bounded by the graphs of $x = 3y$ and $y^2 = 16x$. These curves intersect at the origin and at the point $(x, y) = (144, 48)$. Revolve $\mathbf{R}$ around the horizontal line $y = 72$ to form a solid. In the following manner, set up but do not evaluate definite integrals which represent the volume of the solid. Use proper notation.

   (a) Integrate with respect to x.

   (b) Integrate with respect to y. (The integrands in parts (a) and (b) should be different.)

7. (8 points) Evaluate the definite integral. Simplify your answer.

$$\int_0^1 \frac{36x^8}{\sqrt{144x^9+25}}\,dx$$

8. (8 points) Evaluate the definite integral. Simplify your answer.

$$\int_{-\ln 5}^{\ln 5} 50e^{2x}\,dx$$

9. (8 points) Evaluate the indefinite integral.

$$\int \tan x \sec^{42} x \, dx$$

10. (8 points) Evaluate the indefinite integral.

$$\int 144x \left(12x + 1\right)^{68} \, dx$$

11. (8 points) Evaluate the indefinite integral.

$$\int \frac{e^{9x}}{e^{18x}+1}\,dx$$

12. (10 points) Use a linear approximation to estimate $e^{3/8}$ and write your answer either in decimal form or as a simplified fraction.

Students – do not write on this page!

1. (5 points) _____
2. (5 points) _____
3. (10 points) _____
4. (10 points) _____
5. (10 points) _____
6. (10 points) _____
7. (8 points) _____
8. (8 points) _____
9. (8 points) _____
10. (8 points) _____
11. (8 points) _____
12. (10 points) _____

TOTAL (100 points) _____