MATH 220 **Test 3** **Fall 2012**

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, Hannah Kolb Spinoza
▷ **AD2**, TR 9:00-10:50, Ki Yeun Kim
▷ **AD3**, TR 1:00-2:50, Michael Santana
▷ **ADA**, TR 8:00-8:50, Ziying Pan
▷ **ADB**, TR 9:00-9:50, Ziying Pan
▷ **ADC**, TR 10:00-10:50, Lisa Hickok
▷ **ADD**, TR 11:00-11:50, Lisa Hickok
▷ **ADE**, TR 12:00-12:50, Andrew McConvey
▷ **ADF**, TR 1:00-1:50, Jian Liang
▷ **ADG**, TR 2:00-2:50, Derrek Yager
▷ **ADH**, TR 3:00-3:50, Lechao Xiao
▷ **ADI**, TR 4:00-4:50, Lechao Xiao
▷ **ADJ**, TR 9:00-9:50, Meghan Galiardi
▷ **ADK**, TR 10:00-10:50, Meghan Galiardi
▷ **ADL**, TR 11:00-11:50, Andrew McConvey
▷ **ADM**, TR 12:00-12:50, Benjamin Fulan
▷ **ADN**, TR 1:00-1:50, Benjamin Fulan
▷ **ADO**, TR 2:00-2:50, Jian Liang
▷ **ADP**, TR 3:00-3:50, Hongfei Tian
▷ **ADQ**, TR 4:00-4:50, Hongfei Tian
▷ **ADR**, TR 9:00-9:50, Noah Chartoff
▷ **ADS**, TR 12:00-12:50, Derrek Yager
▷ **ADT**, TR 2:00-2:50, Anna Weigandt
▷ **ADU**, TR 3:00-3:50, Anna Weigandt

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FRONT OF ROOM – 314 Altgeld Hall

1. (10 points) Evaluate the definite integral. Simplify your answer.

$$\int_{-1}^{1} \left(x^2 + \sin\left(x^5\right)\right)\, dx$$

2. (10 points) Evaluate the definite integral. Simplify your answer.

$$\int_{0}^{2} \frac{6x^2}{x^3 + 1}\, dx$$

3. (10 points) Evaluate the indefinite integral.

$$\int x\sqrt{2x+1}\,dx$$

4. (10 points) Evaluate the indefinite integral.

$$\int \tan^3 x \sec x\,dx$$

5. (10 points) Evaluate the indefinite integral.

$$\int \cos^3 x \, dx$$

6. (10 points) Determine the formula for a function $f(x)$ such that $f''(x) = 12e^{2x} + \cos x$, $f'(0) = 10$ and $f(0) = 8$.

7. (8 points) Fill in the missing information to show that the given definite integral can be expressed as the limit of a Riemann sum. The only variables appearing in your limit should be n and k. You do not need to evaluate this limit.

$$\int_2^6 \sin\left(x^2\right) dx = \lim_{n\to\infty} \sum_{k=1}^{n} \Bigg[\qquad \Bigg]$$

8. (7 points) Suppose that a polynomial g satisfies the following conditions.

- $g(2) = 5$
- $g'(2) = 3$
- $g''(2) = 4$
- $g'''(2) = 1$

Use a linear approximation to estimate the value of $g(1.9)$. Simplify and write your answer in decimal form.

9. (10 points) Let $\mathbf{R}$ be the finite region bounded by $8y = x^2$ and $x = y^2$. In the following manner set up, but do not evaluate, definite integrals which represent the volume of the solid obtained when $\mathbf{R}$ is revolved around the vertical line $x = 10$.

   (a) Integrate with respect to x.

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

10. (15 points) You are given the following definite integrals of an odd function $f(x)$.

$$\int_0^5 f(x)\,dx = 10$$
$$\int_0^8 f(x)\,dx = 22$$
$$\int_2^8 f(x)\,dx = 16$$

Evaluate the following definite integrals.

(a) $\displaystyle\int_8^8 \cos\left(f(x)\right)\,dx$

(b) $\displaystyle\int_8^2 10f(x)\,dx$

(c) $\displaystyle\int_{-2}^8 \left(f(x)+5\right)\,dx$

(d) $\displaystyle\int_2^5 f(x)\,dx$

(e) $\displaystyle\int_0^{\sqrt{5}} 6xf(x^2)\,dx$

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. (8 points) _____
8. (7 points) _____
9. (10 points) _____
10. (15 points) _____

TOTAL (100 points) _____