MATH 220 **Test 3** **Spring 2017**

Name _____ **NetID** _____

UIN _____

Circle your TA discussion section.

- ▷ **AD1**, TR 9:00-10:50, Andrew McConvey
- ▷ **AD2**, TR 1:00-2:50, Sarah Loeb
- ▷ **ADA**, TR 8:00-8:50, Christopher Linden
- ▷ **ADB**, TR 9:00-9:50, Dakota Ihli
- ▷ **ADC**, TR 10:00-10:50, Cassie Christenson
- ▷ **ADD**, TR 11:00-11:50, Daulet Dyussekenov
- ▷ **ADE**, TR 12:00-12:50, Daulet Dyussekenov
- ▷ **ADF**, TR 1:00-1:50, Cassie Christenson
- ▷ **ADG**, TR 2:00-2:50, Xinghua Gao
- ▷ **ADH**, TR 3:00-3:50, Xinghua Gao
- ▷ **ADJ**, TR 9:00-9:50, Lan Wang
- ▷ **ADK**, TR 10:00-10:50, Lan Wang
- ▷ **ADO**, TR 2:00-2:50, Christopher Linden
- ▷ **ADQ**, TR 4:00-4:50, Dakota Ihli

- Sit in your assigned seat (circled below).
- 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.
- There is no partial credit on multiple-choice questions. For all other questions, you must show sufficient work to justify your 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.

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1. (10 points) Express $\ln(115) - 3\ln(5)$ as a single logarithm. Now use a linear approximation to estimate its value. Simplify and write your answer in decimal form.

2. (10 points) Suppose that $f(x)$ is an even function which satisfies the following conditions.

   - $\int_0^{49} f(x)\,dx = 900$
   - $\int_{-3}^{3} f(x)\,dx = 300$

   Evaluate the following quantities.

   (a) $\int_3^{49} (f(x) + 100)\ dx$

   (b) $\int_7^0 18xf\left(x^2\right)\ dx$

3. (10 points) Let $g(x) = \displaystyle\int_{x^4+500x}^{8} \frac{1}{t^{64}+16}\,dt$. Determine the x-value for the highest point on the graph of $g(x)$.

4. (10 points) Evaluate the following limit. Be sure to use proper notation throughout your evaluation of this limit. Simplify your answer.

$$\lim_{n\to\infty} \sum_{k=1}^{n} \left(\frac{54k^2 + 48nk + 5}{n^3} \right)$$

5. (10 points) Let $\mathbf{R}$ be the finite region bounded by the graphs of $y = 4x^2$ and $y = 32x$. These curves intersect at the origin and at the point $(x, y) = (8, 256)$. Revolve $\mathbf{R}$ around the vertical line $x = 10$ to form a solid. In the following manner, set up <u>but do not evaluate</u> 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.)

6. (10 points) At time t hours, a population of bacteria is growing at a rate of $8t + 5$ bacteria per hour. If the population is 2500 at time $t = 4$, then what is the population at time $t = 6$ hours?

7. (10 points) Find the average value of the function $f(x) = \dfrac{96}{\sqrt{12x + 25}}$ on the interval $[-2, 2]$. Simplify your answer.

8. (10 points) Evaluate the indefinite integral.

$$\int \left(91x^6 + 42 + \frac{9}{x} + \csc^2(x) + \csc(x)\cot(x)\right)\, dx$$

9. (10 points) Evaluate the indefinite integral.

$$\int \sin^3(x)\cos^{93}(x)\, dx$$

10. (10 points) Evaluate the indefinite integral.

$$\int \frac{126e^{42x}}{e^{84x}+1}\,dx$$

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

TOTAL (100 points) _____