MATH 220 **Test 3** **Spring 2016**

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, Hannah Burson
- ▷ **AD2**, TR 1:00-2:50, Cassie Christenson
- ▷ **ADA**, TR 8:00-8:50, Iftikhar Ahmed
- ▷ **ADB**, TR 9:00-9:50, Iftikhar Ahmed
- ▷ **ADC**, TR 10:00-10:50, Elizabeth 'Liz' Tatum
- ▷ **ADD**, TR 11:00-11:50, Elizabeth 'Liz' Tatum
- ▷ **ADE**, TR 12:00-12:50, Emily Heath
- ▷ **ADF**, TR 1:00-1:50, Emily Heath
- ▷ **ADG**, TR 2:00-2:50, Dara Zirlin
- ▷ **ADH**, TR 3:00-3:50, Dara Zirlin
- ▷ **ADJ**, TR 9:00-9:50, Xujun 'Henry' Liu
- ▷ **ADK**, TR 10:00-10:50, Xujun 'Henry' Liu
- ▷ **ADL**, TR 11:00-11:50, Jooyeon 'Jane' Chung
- ▷ **ADM**, TR 12:00-12:50, Jooyeon 'Jane' Chung
- ▷ **ADN**, TR 1:00-1:50, Xiaolong 'Hans' Han
- ▷ **ADO**, TR 2:00-2:50, Martino Fassina
- ▷ **ADP**, TR 3:00-3:50, Martino Fassina
- ▷ **ADQ**, TR 4:00-4:50, Xiaolong 'Hans' Han

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FRONT OF ROOM – 100 Materials Science and Engineering Building

1. (10 points) Use a linear approximation to estimate $\ln(7/8)$. Write your answer as either a simplified fraction or a decimal value.

2. (10 points) Suppose that $f(x)$ is a polynomial which satisfies the following conditions.

   - $\displaystyle\int_7^{15} f(x)\,dx = 23$
   - $\displaystyle\int_{21}^{15} f(x)\,dx = 13$

   Evaluate the following quantities.

   (a) $\displaystyle\int_7^{21} (20f(x) + 3)\ dx$

   (b) $\displaystyle\int_1^2 54x^2 f\left(2x^3 + 5\right)\ dx$

3. (10 points) Let $g(x) = \displaystyle\int_{\sin(9x)}^{10} \frac{1}{t^{16}+1}\,dt$. Find $g'(x)$.

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

$$\lim_{n\to\infty} \sum_{k=1}^{n} \left(\frac{60k + 12n}{n^2} \right)$$

5. (10 points) Let $\mathbf{R}$ be the finite region bounded by the graphs of $y = \frac{1}{5}x$ and $y = \sqrt{x}$. These curves intersect at the origin and at the point $(x, y) = (25, 5)$. Revolve $\mathbf{R}$ around the horizontal line $y = 8$ 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) Determine the formula for a function $f(x)$ such that $f''(x) = 630e^{3x} + 40\cos x$, $f'(0) = 20$ and $f(0) = 80$.

7. (10 points) Find the average value of the function $f(x) = \dfrac{32x}{\sqrt{2x^2 + 49}}$ on the interval $[0, 4]$. Simplify your answer.

8. (10 points) Evaluate the indefinite integral.

$$\int \frac{9x^2 + 84x + 9}{x^2 + 1}\, dx$$

9. (10 points) Evaluate the indefinite integral.

$$\int \sec^{37}(x) \tan^3(x)\, dx$$

10. (10 points) Evaluate the indefinite integral.

$$\int \frac{91x^{12}}{x^{26}+1}\,dx$$

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) _____
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10. (10 points) _____

TOTAL (100 points) _____