MATH 220 **Test 3** **Fall 2016**

Name _____ **NetID** _____

UIN _____

- 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, Andrew McConvey
▷ **AD2**, TR 9:00-10:50, Ben Wright
▷ **AD3**, TR 1:00-2:50, Cassie Christenson
▷ **ADA**, TR 8:00-8:50, Alexi Block Gorman
▷ **ADB**, TR 9:00-9:50, Dakota Ihli
▷ **ADC**, TR 10:00-10:50, Elizabeth Field
▷ **ADD**, TR 11:00-11:50, Adam Wagner
▷ **ADE**, TR 12:00-12:50, Adam Wagner
▷ **ADF**, TR 1:00-1:50, Tsutomu Okano
▷ **ADG**, TR 2:00-2:50, Xujun 'Henry' Liu
▷ **ADH**, TR 3:00-3:50, Mychael Sanchez
▷ **ADI**, TR 4:00-4:50, Mychael Sanchez
▷ **ADJ**, TR 9:00-9:50, Kyle Pratt
▷ **ADK**, TR 10:00-10:50, Kyle Pratt
▷ **ADL**, TR 11:00-11:50, Tigran Hakobyan
▷ **ADM**, TR 12:00-12:50, Liz Tatum
▷ **ADN**, TR 1:00-1:50, Xujun 'Henry' Liu
▷ **ADO**, TR 2:00-2:50, Tigran Hakobyan
▷ **ADP**, TR 3:00-3:50, Liz Tatum
▷ **ADQ**, TR 10:00-10:50, Dakota Ihli
▷ **ADR**, TR 9:00-9:50, Elizabeth Field
▷ **ADS**, TR 12:00-12:50, Tsutomu Okano
▷ **ADT**, TR 2:00-2:50, Anna Weigandt
▷ **ADU**, TR 3:00-3:50, Anna Weigandt

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FRONT OF ROOM – 100 Materials Science and Engineering Building

1. (5 points) Suppose that B and B' are each differentiable (and thus continuous) everywhere and that p and q are constants. Circle the choice below which most clearly states part 2 of the Fundamental Theorem of Calculus.

(a) $\displaystyle\int_p^q B(t)\,dt = B(p) - B(q)$

(b) $\displaystyle\int_p^q B'(t)\,dt = B(p) - B(q)$

(c) $\displaystyle\int_p^q B(t)\,dt = B(q) - B(p)$

(d) $\displaystyle\int_p^q B'(t)\,dt = B(q) - B(p)$

(e) $\displaystyle\int_p^q B(t)\,dt = B'(p) - B'(q)$

(f) $\displaystyle\int_p^q B'(t)\,dt = B'(p) - B'(q)$

(g) $\displaystyle\int_p^q B(t)\,dt = B'(q) - B'(p)$

(h) $\displaystyle\int_p^q B'(t)\,dt = B'(q) - B'(p)$

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

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

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

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

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

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

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

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

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

3. (10 points) Let $\mathbf{R}$ be the finite region bounded by the graphs of $y = e^x$, $y = 13$ and $x = 0$. Revolve $\mathbf{R}$ around the horizontal line $y = 16$ 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.)

4. (10 points) Use a linear approximation to estimate $\ln(95/100)$. Write your answer as either a simplified fraction or a decimal value.

5. (10 points) Let $g(x) = \displaystyle\int_9^{x^3-22} (t-42)\, e^{t^{15}}\, dt$. Determine the x-value for the lowest point on the graph of $g(x)$.

6. (10 points) Fill in the missing information to show that the area between the x-axis and the graph of $f(x) = 42e^{-5x}$ on the interval $[2, 10]$ 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.

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

7. (10 points) Determine the formula for a function $g(x)$ such that $g'(x) = 35e^{-5x} - 12\sin(6x)$ and $g(0) = 20$.

8. (10 points) Find the average value of the function $f(x) = 2e^{(x/6)}$ on the interval $[30, 42]$. Simplify your answer.

9. (10 points) Evaluate the indefinite integral.

$$\int \frac{63x^8 \cos\left(\ln\left(x^9+6\right)\right)}{x^9+6}\,dx$$

10. (10 points) Evaluate the indefinite integral.

$$\int 9x^{17}\left(x^9+501\right)^{500}\,dx$$

11. (10 points) Evaluate the indefinite integral.

$$\int \sec^{42}(x) \tan^{3}(x)\, dx$$

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. (10 points) _____
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TOTAL (100 points) _____