AL2 (MWF 9:00-9:50) AL1 (MWF 12:00-12:50) AL3 (MWF 1:00-1:50)

MATH 220 **Test 3** **Fall 2015**

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, Derek Jung
▷ **AD2**, TR 9:00-10:50, Claire Merriman
▷ **AD3**, TR 1:00-2:50, Itziar Ochoa de Alaiza Gracia
▷ **ADA**, TR 8:00-8:50, Dara Zirlin
▷ **ADB**, TR 9:00-9:50, Dara Zirlin
▷ **ADC**, TR 10:00-10:50, Xujun Liu
▷ **ADD**, TR 11:00-11:50, Christopher Linden
▷ **ADE**, TR 12:00-12:50, Christopher Linden
▷ **ADF**, TR 1:00-1:50, Alyssa Loving
▷ **ADG**, TR 2:00-2:50, Xianchang Meng
▷ **ADH**, TR 3:00-3:50, Xianchang Meng
▷ **ADI**, TR 4:00-4:50, Aaron Schneberger
▷ **ADJ**, TR 9:00-9:50, Elizabeth Field
▷ **ADK**, TR 10:00-10:50, Elizabeth Field
▷ **ADL**, TR 11:00-11:50, Emily Heath
▷ **ADM**, TR 12:00-12:50, Alyssa Loving
▷ **ADN**, TR 1:00-1:50, Aaron Schneberger
▷ **ADO**, TR 2:00-2:50, Tigran Hakobyan
▷ **ADP**, TR 3:00-3:50, Tigran Hakobyan
▷ **ADR**, TR 9:00-9:50, Xujun Liu
▷ **ADS**, TR 12:00-12:50, Emily Heath
▷ **ADT**, TR 2:00-2:50, Argen West
▷ **ADU**, TR 3:00-3:50, Argen West

	◇	◇	◇	◇
	Q1	Q2	Q3	Q4
	P1	P2	P3	P4
N1	N2	N3	N4	N5
M1	M2	M3	M4	M5
L1	L2	L3	L4	L5
K1	K2	K3	K4	K5
J1	J2	J3	J4	J5
H1	H2	H3	H4	H5
G1	G2	G3	G4	G5
F1	F2	F3	F4	F5
E1	E2	E3	E4	E5
D1	D2	D3	D4	D5
C1	C2	C3	C4	C5
B1	B2	B3	B4	B5
A1	◇	◇	◇	◇

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	
P1	P2	P3	P4	P5	P6	P7	P8	P9	
N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
J1	J2	J3	J4	J5	J6	J7	J8	J9	J10
H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
G1	G2	G3	G4	G5	G6	G7	G8	G9	G10
F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10

R1	R2	R3		
Q1	Q2	Q3	Q4	
P1	P2	P3	P4	P5
N1	N2	N3	N4	N5
M1	M2	M3	M4	M5
L1	L2	L3	L4	L5
K1	K2	K3	K4	K5
J1	J2	J3	J4	J5
H1	H2	H3	H4	H5
G1	G2	G3	G4	G5
F1	F2	F3	F4	F5
E1	E2	E3	E4	E5
D1	D2	D3	D4	D5
C1	C2	C3	C4	C5
B1	B2	B3	B4	B5
◇	◇	◇	◇	A5

FRONT OF ROOM – 114 David Kinley Hall

1. (5 points) Suppose that G and G' 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) $\displaystyle\int_p^q G'(t)\ dt = G'(q) - G'(p)$

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

(c) $\displaystyle\int_p^q G'(t)\ dt = G(q) - G(p)$

(d) $\displaystyle\int_p^q G(t)\ dt = G(q) - G(p)$

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

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

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

(h) $\displaystyle\int_p^q G(t)\ dt = G(p) - G(q)$

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 $x_1, x_2, x_3, x_4, \ldots$. Circle the choice below which 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. (5 points each) Let **R** be the finite region bounded by the graphs of $y = 5x$ and $y = 20\sqrt{x}$. These curves intersect at the origin and at the point $(x, y) = (16, 80)$. Revolve **R** around the vertical line $x = 20$ 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.)

4. (10 points) Fill in the missing information to show that the definite integral 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 the definite integral or the limit.

$$\int_5^9 (\sin(8x) + 42)\, dx = \lim_{n\to\infty} \sum_{k=1}^{n} \Bigg[\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \Bigg]$$

5. (10 points) Express $\ln(388) - 2\ln(20)$ as a single logarithm. Now use a linear approximation to estimate its value. Simplify and write your answer in decimal form.

6. (10 points) Let $g(x) = \int_0^{x^3-192x} e^{t^8}\, dt$. Determine the x-value for each local maximum on the graph of $g(x)$.

7. (10 points) Find the average value of the function $f(x) = \dfrac{28x}{x^2+7}$ on the interval $[3, 5]$. Simplify your answer.

8. (10 points) Evaluate the indefinite integral.

$$\int \frac{x^9 + x^7 + 42}{x^2 + 1}\, dx$$

9. (10 points) Evaluate the indefinite integral.

$$\int 72e^{9x} \csc^2\left(e^{9x}\right) dx$$

10. (10 points) Evaluate the indefinite integral.

$$\int 121x\,(11x+5)^{42}\;dx$$

11. (10 points) Evaluate the indefinite integral.

$$\int \sin^3(x)\cos^{13}(x)\,dx$$

Students – do not write on this page!

1. (5 points) ______________________

2. (5 points) ______________________

3a. (5 points) ______________________

3b. (5 points) ______________________

4. (10 points) ______________________

5. (10 points) ______________________

6. (10 points) ______________________

7. (10 points) ______________________

8. (10 points) ______________________

9. (10 points) ______________________

10. (10 points) ______________________

11. (10 points) ______________________

TOTAL (100 points) ______________