DO NOT WRITE ABOVE THIS LINE!!

MATH 210 Exam 2

October 27, 2016

Directions. Fill in each of the lines below. Then read the directions that follow before beginning the exam. YOU MAY NOT OPEN THE EXAM UNTIL TOLD TO DO SO BY YOUR INSTRUCTOR.

Name: ____________________

UIN: ____________________

University Email: ____________________

Check next to your instructor's name:

Lukina	10am	
Lukina	11am	
Steenbergen	11am	
Steenbergen	12pm	
Kobotis	8am	
Sparber	2pm	
Leslie	2pm	
Awanou	3pm	
Heard	9am	
Woolf	9am	
Abramov	12pm	
Sinapova	3pm	
Hong	10am	
Freitag	1pm	
Greenblatt	1pm	

- All of your work must fit within the boxes on each page for each question. Nothing outside of the box will be graded! If you write outside of the box, there is a good chance that your solution will not be read and therefore not graded.
- A solution for one problem may not go on another page.
- Show all your work. Unjustified answers are not correct. Make clear what your final answer is.
- Have your student ID ready to be checked when submitting your exam.

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1. **(20 pt)** Let $f(x, y) = \ln(2x + y)$.

   (a) Write the equation of the tangent plane to $f(x, y)$ at $(-1, 3)$.

   (b) Use part (a) to estimate $f(-1.1, 2.9)$.

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2. **(15pt)** For the function

$$f(x, y) = x^3 - 12x + y^2 - 4y + 1,$$

find the critical points and classify them as local minima, local maxima, or saddle points.

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3. **(15pt)** Use the method of Lagrange multipliers to find the minimum and the maximum of the function

$$f(x, y) = x - 2y$$

on the circle $x^2 + y^2 = 1$.

4. **(15 pt)** For the integral

$$\int_0^1 \int_y^1 \cos(x^2)\, dx\, dy$$

- Sketch the region of integration.
- Change the order of integration.
- Evaluate the integral.

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5. **(15 pt)** Evaluate the iterated integral by converting to cylindrical coordinates

$$\int_{-2}^{2}\int_{0}^{\sqrt{4-x^2}}\int_{0}^{1}(x^2+y^2)\,dz\,dy\,dx$$

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6. **(20 pt)** a) Write down an iterated double integral which expresses the area of the triangular region with vertices $(0,0)$, $(6,0)$ and $(0,1)$. Do not evaluate the integral.

   b) Write down an iterated triple integral that expresses the volume of the tetrahedron bounded by the xy-plane, yz-plane, xz-plane and the plane $2x+4y+6z=8$. Do not evaluate the integral.