DATE: October 23, 2013

DEPARTMENT & COURSE NO: <u>MATH 1500</u> EXAMINATION: <u>Introduction to Calculus</u> MIDTERM TITLE PAGE TIME: <u>1 hour</u> EXAMINER: <u>Various</u>

SURNAME: (Print in ink)
GIVEN NAME(S):
STUDENT NUMBER:
SIGNATURE: (in ink)

(I understand that cheating is a serious offense)

O. Gueye

**B.** Waters

M. Virgilio

K. Gupta

D. Kalajdzievska

D. Kalajdzievska

W. Korytowski

# PLEASE CHECK THE APPROPRIATE BOX BELOW

- □ A01 MWF 10:30 & T 10:00 W. Korytowski
- □ A02 MWF 9:30
- □ A03 MWF 11:30
- □ A04 MWF 12:30
- □ A05 TR 11:30
- □ A06 T 7:00
- □ A07 MWF 12:30
- □ A08 MWF 8:30

## **INSTRUCTIONS TO STUDENTS:**

This is a 1 hour exam. **Please show your work clearly** in the space provided below each question. If you need more room, you may continue your work on the reverse side of the page, but CLEARLY INDICATE that your work is continued.

No textbooks, notes, or other aids are permitted. There are no cellphones or electronic translators permitted.

Please check that you have all of the pages in the exam booklet. This exam has a title page, 5 pages of questions and also 1 blank page for rough work. You may remove the blank page if you want, but be careful not to loosen the staple.

The value of each question is indicated in the lefthand margin beside the statement of the question. The total value of all questions is 70 points.

Question	Points	Score
1	15	
2	16	
3	9	
4	5	
5	5	
6	8	
7	12	
Total:	70	

## DATE: October 23, 2013

DEPARTMENT & COURSE NO: <u>MATH 1500</u> EXAMINATION: <u>Introduction to Calculus</u>

1. Evaluate the following limits. If the limit does not exist, explain why, or state whether it tends to  $\infty$  or  $-\infty$ .

[5] (a) 
$$\lim_{x \to 3} \frac{2\sqrt{x+6}-6}{x-3}$$

[5] (b) 
$$\lim_{x \to -\infty} \frac{\sqrt{x^2 - 3}}{2x - 1}$$

[5] (c) 
$$\lim_{x \to 4} \frac{x-4}{|x-4|}$$

## DATE: October 23, 2013

DEPARTMENT & COURSE NO: <u>MATH 1500</u> EXAMINATION: <u>Introduction to Calculus</u> MIDTERM PAGE: 2 of 6 TIME: <u>1 hour</u> EXAMINER: <u>Various</u>

2. Find f'(x). DO NOT SIMPLIFY YOUR ANSWERS

[4] (a)  $f(x) = (\cos x)\cos(\sin x)$ 

[6] (b) 
$$f(x) = (3x^3 - \frac{3}{x} + \sqrt{3x - 2})^5$$

[6] (c) 
$$f(x) = \frac{x^2 e^x - 3x}{2x + 2}$$

## DATE: October 23, 2013

DEPARTMENT & COURSE NO: <u>MATH 1500</u> EXAMINATION: <u>Introduction to Calculus</u>

[9] 3. Find the equation of the tangent line to the curve  $4xy = (x^2 + y^2)^2$  at the point (1, 1).

[5] 4. Use the **definition of the derivative** to determine f'(x) if  $f(x) = x^2 + x$ .

DATE: October 23, 2013

DEPARTMENT & COURSE NO: <u>MATH 1500</u> EXAMINATION: <u>Introduction to Calculus</u>

[5] 5. Prove the following theorem: if a(x) and b(x) are differentiable, then  $\frac{d}{dx}[a(x) + b(x)] = \frac{d}{dx}a(x) + \frac{d}{dx}b(x).$ 

6. If

$$f(x) = \begin{cases} \frac{x^2 + x - 2}{x - 1} & \text{if } x < 1\\ b & \text{if } x = 1\\ ax^2 - 6a & \text{if } x > 1 \end{cases}$$

[5] (a) Find the value(s) of a that will cause  $\lim_{x \to 1} f(x)$  to exist. Justify your answer.

[3] (b) Find the value(s) of b that will cause f(x) to be continuous at x = 1. Justify your answer.

# DATE: October 23, 2013

DEPARTMENT & COURSE NO: <u>MATH 1500</u> EXAMINATION: <u>Introduction to Calculus</u> MIDTERM PAGE: 5 of 6 TIME: <u>1 hour</u> EXAMINER: <u>Various</u>

[12] 7. A 10m ladder is sliding down a vertical wall forming a right triangle with the ground and wall as its sides. At the moment the top of the ladder is 6m up the wall it is sliding down at 2 m/s. What is the rate of change of the **area** of the triangle formed by the ladder, wall, and ground, at this moment?

DATE: October 23, 2013

DEPARTMENT & COURSE NO: <u>MATH 1500</u> EXAMINATION: <u>Introduction to Calculus</u> MIDTERM PAGE: 6 of 6 TIME: <u>1 hour</u> EXAMINER: <u>Various</u>

# ROUGH WORK