

DATE: May 26, 2010

MIDTERM EXAMINATION

TITLE PAGE

DEPARTMENT & COURSE NO: MATH 1500TIME: 1 hourEXAMINATION: Intro to CalculusEXAMINER: Borgersen

NAME: (Print in ink) _____

STUDENT NUMBER: _____

SIGNATURE: (in ink) _____

(I understand that cheating is a serious offense)

INSTRUCTIONS TO STUDENTS:

This is a 1 hour exam. **Please show your work clearly.**

No texts or notes are permitted. No calculators are permitted. Cell phones, electronic translators, and other electronic devices are **not** permitted.

This exam has a title page and 8 pages of questions, including 2 blank pages for rough work. Please check that you have all the pages. You may remove the blank pages if you want, but be careful not to loosen the staples.

The value of each question is indicated beside the statement of the question. The total value of all questions is 54 points.

If you need more scrap paper, use the back of the question pages.

Question	Points	Score
1	8	
2	12	
3	4	
4	6	
5	8	
6	8	
7	8	
Total:	54	

Short Answer

1. [8 points] Find the values of the following limits. If the limit does not exist, write either ∞ , $-\infty$, or "Does Not Exist" as appropriate. Write your answers on the lines to the right.

(a) $\lim_{x \rightarrow 2^-} \frac{x^2 - 4}{x - 2}$

(a) _____

(b) $\lim_{x \rightarrow -\infty} \frac{3x + 5}{\sqrt{x^2 + 7}}$

(b) _____

(c) $\lim_{x \rightarrow 4} \frac{\sqrt{25 - x^2} - 3}{4 - x}$

(c) _____

(d) $\lim_{x \rightarrow -2^-} \frac{x^2 + 5x + 6}{x(x + 2)^2}$

(d) _____

2. [12 points] Find the derivative of each of the following functions. You may use any method. **DO NOT SIMPLIFY YOUR ANSWERS.** Underline your final answer.

(a) $f(x) = (5x)^5 + \frac{1}{5x} + (5)^{5x} + (5\pi)^{-5}$

(b) $g(t) = (t^2 + 1) \tan t$

(c) $h(x) = e^{\sqrt{x^2+1}}$

(d) $f(x) = \frac{x^2 \sin x}{1 + \cos 3x}$

3. [4 points] Find the domain and range of each of the following functions:

(a) $g(x) = \sqrt{1 - x^2}$

Domain: _____

Range: _____

(b) $f(x) = \frac{\sqrt{x}}{-\sqrt{x}}$

Domain: _____

Range: _____

4. [6 points] On the following Cartesian plane, draw a sketch of any function f that satisfies the following requirements:

(a) The domain of f is $[-4, 4)$

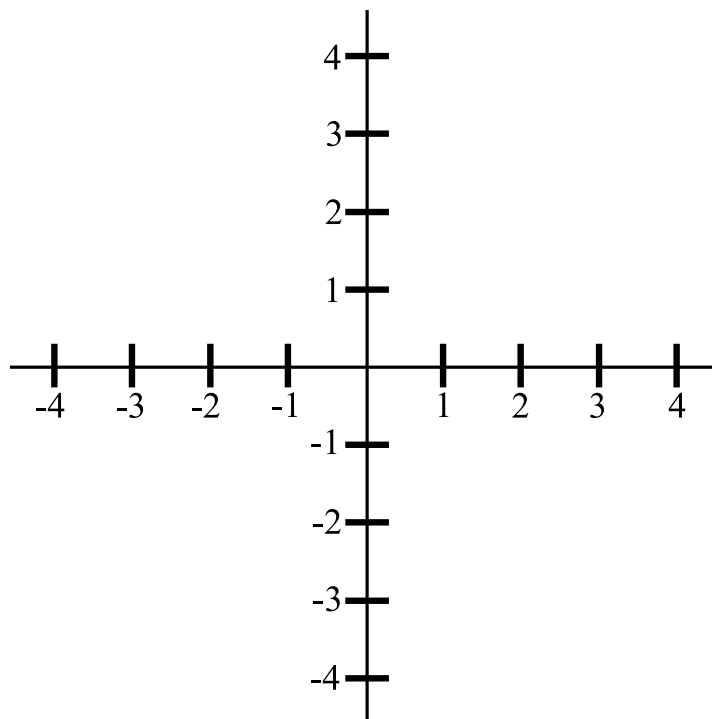
(b) $f(0) = 0$

(c) $\lim_{x \rightarrow 1} f(x) = \infty$

(d) $\lim_{x \rightarrow 0^-} f(x) = -\infty$

(e) $\lim_{x \rightarrow -4^+} f(x) = 2$

(f) $\lim_{x \rightarrow 4^-} f(x) = -2$



Long Answer

5. [8 points] Find all values for a such that the following function is continuous at -1 . Use limits to justify your answer(s).

$$f(x) = \begin{cases} 2a + x\sqrt{a} & \text{if } x < -1, \\ x^2 + x & \text{if } x \geq -1. \end{cases}$$

DATE: May 26, 2010

MIDTERM EXAMINATION

PAGE: 5 of 8

DEPARTMENT & COURSE NO: MATH 1500TIME: 1 hourEXAMINATION: Intro to CalculusEXAMINER: Borgersen

6. [8 points] Prove that for any functions f and g differentiable at a ,

$$(fg)'(a) = g(a)f'(a) + f(a)g'(a).$$

DATE: May 26, 2010

MIDTERM EXAMINATION

PAGE: 6 of 8

DEPARTMENT & COURSE NO: MATH 1500TIME: 1 hourEXAMINATION: Intro to CalculusEXAMINER: Borgersen

7. [8 points] Use the definition of the derivative to find $f'(x)$ if

$$f(x) = \frac{1}{x+5}.$$

UNIVERSITY OF MANITOBA

DATE: May 26, 2010

MIDTERM EXAMINATION

PAGE: 7 of 8

DEPARTMENT & COURSE NO: MATH 1500

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SCRAP PAPER

UNIVERSITY OF MANITOBA

DATE: May 26, 2010

MIDTERM EXAMINATION

PAGE: 8 of 8

DEPARTMENT & COURSE NO: MATH 1500

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SCRAP PAPER