

Instructor's Name (Print)

Student's Name (Print)

Student's Signature

Student Number

THE UNIVERSITY OF WESTERN ONTARIO
LONDON CANADA
DEPARTMENT OF MATHEMATICS
Mathematics 012a Test 1

Friday, October 13, 2006

Code 111

7:00 p.m. - 8:30 p.m.

INSTRUCTIONS

1. There are two parts to this exam:
PART A (17 marks) in multiple choice format and
PART B (23 marks) in show your work format.
2. Do not unstaple the booklet. Questions are printed on both sides of the paper, they begin on Page 1 and continue to Page 6. There are 17 questions in Part A and 5 questions in Part B.
3. Fill in the information at the top of this page as indicated.
4. Use the (scantron) answer sheet for Part A of this exam. Sign the answer sheet, and mark your STUDENT NUMBER (all 9 digits), SECTION, and EXAM CODE as indicated. Mark your answers to all questions (1-17) on the (scantron) answer sheet and circle the answer on the exam (question) paper. Code as you go. Extra time will NOT be given for coding answers at the end of the test. Be advised that only the scantron card will be graded in this section.
5. There are two different codes of the exam. DO NOT FORGET to mark your exam code on the scantron card.
6. Test paper, (scantron) answer sheet and all scrap paper must be handed in at the end of the test!
7. In Part B, answer all questions in the space provided, and show all your work unless otherwise instructed.
8. CALCULATORS ARE NOT PERMITTED.
9. There is one blank page at the end of the booklet for rough work. This page may be removed, but do not remove any other pages from the booklet. The test booklet has 6 pages. CHECK THAT YOU HAVE A COMPLETE BOOKLET.
10. TOTAL MARKS = 40.

FOR GRADING ONLY

PAGE	MARK
1	
2	
3	
4	
5	
6	
TOTAL	

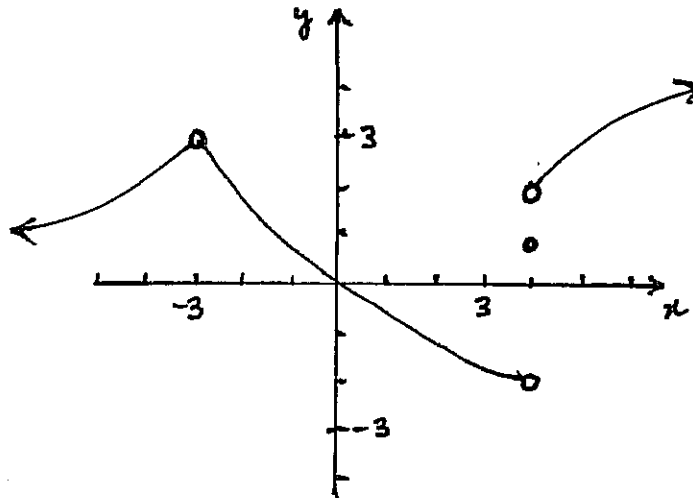
1. Find the slope of the line that passes through the points $(3, 1)$ and $(0, -1)$.

A: $\frac{3}{2}$	B: $\frac{2}{3}$	C: $-\frac{3}{2}$	D: $-\frac{2}{3}$	E: DNE
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2. Write an equation of the line that passes through the points $(1, -1)$ and $(-1, 3)$.

A: $2x - y - 1 = 0$	B: $2x + y - 1 = 0$	C: $x - 2y + 1 = 0$
D: $x - 2y + 1 = 0$	E: $2x + 2y - 1 = 0$	

Use the graph of $y = f(x)$, provided below, to answer questions A3 to A8. If the quantity is not defined or does not exist, select DNE.



3. Find $f(-3)$ if it exists.

A: 1	B: 2	C: 3	D: 4	E: DNE
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4. Find $f(4)$ if it exists.

A: 0	B: 1	C: -2	D: 2	E: DNE
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5. Find $\lim_{x \rightarrow -3} f(x)$ if it exists.

A: 0	B: 2	C: 3	D: 4	E: DNE
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6. Find $\lim_{x \rightarrow 4^-} f(x)$ if it exists.

A: -2	B: 0	C: 1	D: 2	E: DNE
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7. Find $\lim_{x \rightarrow 4^+} f(x)$ if it exists.

A: -2	B: 0	C: 1	D: 2	E: DNE
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8. Find $\lim_{x \rightarrow 4} f(x)$ if it exists.

A: -2	B: 0	C: 1	D: 2	E: DNE
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9. Find $\lim_{h \rightarrow 0} \frac{2h + h^2}{h + h^3}$ if it exists.

A: 0	B: 1	C: 2	D: 3	E: DNE
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10. Find $\lim_{x \rightarrow 2^+} \frac{x - 2}{1 + x^2}$ if it exists.

A: -2	B: 0	C: 1	D: 2	E: DNE
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11. Find $\lim_{x \rightarrow 0^-} \frac{|x|}{x}$ if it exists.

A: -1	B: 0	C: 1	D: -2	E: DNE
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Use the information given below to answer questions A12 - A14.

A bolt is dropped from a tower with a height of 125m. After t seconds, it is s meters above the ground, where $s(t) = 125 - 5t^2$, $0 \leq t \leq 5$.

12. What is the average velocity between the time $t = 2$ seconds and $t = 4$ seconds, in meters per second?

A: 10	B: 20	C: 25	D: 30	E: 40
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13. What is the velocity of the object at $t = 4$ seconds in meters per second?

A: -10	B: -20	C: -30	D: -40	E: -50
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14. After how many seconds does the object hit the ground?

A: 1	B: 2	C: 3	D: 4	E: 5
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15. Which of the following is a list of all values of x for which the function $f(x) = \frac{x}{x^2 - 9}$ is discontinuous?

A: 0	B: -3	C: 3	D: -3, 3	E: 0, -3, 3
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16. If $f(x) = x(x + 1)^4$ then $f'(0) =$

A: 0	B: 1	C: 2	D: 3	E: 5
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17. If $f(x) = \frac{1 - x^2}{x}$ then $f'(1) =$

A: 0	B: -1	C: 1	D: -2	E: 2
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PART B (23 marks)

NOTE: SHOW ALL YOUR WORK.

5 marks B1. A function $f(x)$ is defined by

$$f(x) = \begin{cases} 3 - x^2, & \text{if } x \leq 2 \\ 2x - 3, & \text{if } x > 2 \end{cases}$$

Find

(a) $f(2)$

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

(c) $\lim_{x \rightarrow 2^+} f(x)$

(d) Is $f(x)$ continuous at $x = 2$? Justify your answer.

3 B2. Use the formula $f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$ to find $f'(4)$ if $f(x) = \sqrt{x}$.
marks

3 B3. Use the formula $f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$ to find $f'(2)$ if $f(x) = x^2 + x$.
marks

9 marks B4. Find the derivative of each of the following. (Do not simplify your answer.)

(a) $y = 10x + \frac{1}{3x^3} - 15$

(b) $y = (\sqrt{x} + x^2)(x^3 - \sqrt[3]{x})$

(c) $y = \frac{1 - x^2}{1 + x^2}$

(d) $y = \left(\frac{x}{1 + x^3} \right)^4$

3 B5. Find the equation of the tangent line to the curve $y = \frac{2}{x^2}$ at the point $(1, 2)$.
marks