MA 123 — Elem. Calculus SPRING 2007
FIRST MIDTERM 02/07/2007

Name: _____ **Sec.:** _____

Do not remove this answer page — you will turn in the entire exam. You have two hours to do this exam. No books or notes may be used. You may use a graphing calculator during the exam, but NO calculator with a Computer Algebra System (CAS) or a QWERTY keyboard is permitted. Absolutely no cell phone use during the exam is allowed.

The exam consists of 15 multiple choice questions. Record your answers on this page by filling in the box corresponding to the correct answer. For example, if (b) is correct, you must write

[a] [b] [c] [d] [e]

Do not circle answers on this page, but please do circle the letter of each correct response in the body of the exam. It is your responsibility to make it CLEAR which response has been chosen. You will not get credit unless the correct answer has been marked on both this page and in the body of the exam.

GOOD LUCK!

1. [a] [b] [c] [d] [e]

2. [a] [b] [c] [d] [e]

3. [a] [b] [c] [d] [e]

4. [a] [b] [c] [d] [e]

5. [a] [b] [c] [d] [e]

6. [a] [b] [c] [d] [e]

7. [a] [b] [c] [d] [e]

8. [a] [b] [c] [d] [e]

9. [a] [b] [c] [d] [e]

10. [a] [b] [c] [d] [e]

11. [a] [b] [c] [d] [e]

12. [a] [b] [c] [d] [e]

13. [a] [b] [c] [d] [e]

14. [a] [b] [c] [d] [e]

15. [a] [b] [c] [d] [e]

For grading use:

Total	
	(out of 100 pts)

Please make sure to list the correct section number on the front page of your exam and on this page. In case you forgot your section number, consult the following table:

Section #	**Instructor**	**Lectures**
001	J. Robbins	MWF 12:00pm-12:50pm, BS 107
002	P. Perry	MWF 2:00pm-2:50pm, CB 118
003	J. Robbins	TR 3:30pm-4:45pm, CB 337
004	S. Speakman	MW 7:30pm-8:45pm, CB 339
004	N. Kirby	TR 6:00pm-7:15pm, CB 339

Multiple Choice Questions

Show all your work on the page where the question appears.
Clearly mark your answer both on the cover page on this exam
and in the corresponding questions that follow.

1. If $P(s) = s^2 + 1$ and $R(t) = t - 2$, then $P(R(x)) =$

Possibilities:

(a) $x^2 - 4x + 5$

(b) $x^2 + 4x + 3$

(c) $x^2 - 1$

(d) $x^2 + 5$

(e) $(x^2 + 1)(x - 2)$

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2. What is the average rate of change of $g(s) = s^2 - 4$ as s changes from 1 to $1 + h$?

Possibilities:

(a) $6 + 3h$

(b) $2 + h$

(c) $4 + 2h$

(d) 2

(e) h

---

3. The inequality $x^2 + 2x - 15 \leq 0$ can be rewritten in the form

Possibilities:

(a) $x \leq -3$ or $x \geq 5$

(b) $-5 \leq x \leq 3$

(c) $x \geq \frac{15}{2}$

(d) $x \leq -5$ or $x \geq 3$

(e) $-3 \leq x \leq 5$

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4. If the equation of the line through the points $(3, 0)$ and $(2, 1)$ is written as

$$y = A + B(x - 2),$$

then

Possibilities:

(a) $A = 1$ and $B = -1$

(b) $A = 3$ and $B = -1$

(c) $A = -1$ and $B = 3$

(d) $A = -1$ and $B = 1$

(e) $A = 5$ and $B = -1$

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5. A rectangular solid has edges of lengths 4 ft, 5 ft, and 8 ft. Suppose we double the length of two of the sides. What is the volume of the new rectangular solid?

Possibilities:

(a) 80 ft^3

(b) 160 ft^3

(c) 320 ft^3

(d) 640 ft^3

(e) 1280 ft^3

---

6. Find the limit

$$\lim_{t \to 2} \frac{t^2 - 4}{t - 2}$$

Possibilities:

(a) Does not exist

(b) 2

(c) 4

(d) 6

(e) 8

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7. If we simplify the expression

$$\frac{a^5b^8 - a^4b^7}{a(ab^2)^2}$$

to the form $a^P b^Q - a^R b^S$, then $R =$

Possibilities:

(a) 0
(b) 1
(c) 2
(d) 3
(e) 4

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8. In this problem you may use the fact that if $f(x) = Ax^2 + Bx + C$ then $f'(x) = 2Ax + B$.

Suppose $X(t)$ represents the height of an object above the ground at time t, where the height is measured in feet and the time t is measured in seconds. If

$$X(t) = -16t^2 + 48t + 144,$$

what is the speed of the object at time $t = 0$?

Possibilities:

(a) 48 feet per second
(b) 144 miles per hour
(c) 32 furlongs per fortnight
(d) 64 feet per second
(e) 96 feet per second

---

9. Suppose the parabola given by the equation $y = A + B(x+1) + C(x+1)(x-2)$ contains the points $(-1, 3)$, $(2, 6)$, and $(3, 7)$. What is the value of B?

Possibilities:

(a) -2
(b) -1
(c) 0
(d) 1
(e) 2

---

10. Suppose that

$$f(x) = \begin{cases} A + x & x < 2 \\ 1 + x^2 & x \geq 2 \end{cases}$$

Find a value of A such that the function $f(x)$ is continuous at the point $x = 2$.

Possibilities:

(a) $A = 8$

(b) $A = 1$

(c) $A = 2$

(d) $A = 3$

(e) $A = 0$

---

11. If $a(t) = t - 4$, find a function $b(t)$ such that $a(b(t)) = t$.

Possibilities:

(a) $b(t) = t$

(b) $b(t) = 4$

(c) $b(t) = t - 4$

(d) $b(t) = t + 4$

(e) $b(t) = 4 - t$

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12. A train travels from city A to city B. It leaves city A at 10:30 AM and arrives at city B at 1:30 PM. The distance between the cities is 150 miles. What was the average speed of the train in miles per hour?

Possibilities:

(a) 60 miles per hour

(b) 150 miles per hour

(c) 50 miles per hour

(d) 75 miles per hour

(e) 130 miles per hour

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13. In this problem you may use the fact that if $f(x) = Ax^2 + Bx + C$ then $f'(x) = 2Ax + B$.

Suppose that $G(x) = x^2 + x - 2$. For what value of x is the tangent line to the graph of $y = G(x)$ parallel to the x-axis?

Possibilities:

(a) $x = -1$

(b) $x = 0$

(c) $x = 2$

(d) $x = 1/2$

(e) $x = -1/2$

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14. Suppose $H(t) = t^2 + 5t + 1$. Find the limit

$$\lim_{t \to 2} H(t)$$

Possibilities:

(a) 15

(b) 1

(c) 9

(d) 6

(e) $2t + 5$

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15. Find the limit

$$\lim_{h \to 0^-} \frac{|4h|}{h}$$

Hint: Evaluate the quotient for some negative values of h close to 0.

Possibilities:

(a) 0

(b) 2

(c) -2

(d) 4

(e) -4
