MA 123 — Elem. Calculus SPRING 2007
SECOND MIDTERM 03/07/2007

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
401	S. Speakman	MW 7:30pm-8:45pm, CB 339
402	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. Let $k(x) = (x+3)(x+4)(x+1)$. Find $k'(x)$.

Possibilities:

(a) 12

(b) $3x^2 + 16x + 19$

(c) $3x^2 + 18x + 20$

(d) $3x^2 + 14x + 16$

(e) 1

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2. Let $f(x) = 3x^2 + 6x + 4$. Find the maximum value of $f(x)$ on the interval $[-2, 1]$.

Possibilities:

(a) 5

(b) 7

(c) 9

(d) 13

(e) -1

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3. If $f(x) = 6x^2 + 3x - 1$, find $f'(x)$.

Possibilities:

(a) $6x + 1$

(b) $12x + 3$

(c) $12x - 1$

(d) $2x + 3$

(e) $2x + 5$

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4. Suppose $F(x) = g(h(x))$. If $g(2) = 3$, $g'(2) = 4$, $h(0) = 2$ and $h'(0) = 6$, find $F'(0)$.

Possibilities:

(a) 12
(b) 4
(c) 24
(d) 6
(e) 3

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5. If $f(s) = (s^2 + 5s + 4)^3$, find $f'(s)$.

Possibilities:

(a) $3(s^2 + 5s + 4)^2$
(b) $3(s^2 + s + 4)^2$
(c) $2(s^2 + 5s + 4) \cdot (2s + 5)$
(d) $3(s^2 + s + 4)^2 \cdot (2s + 1)$
(e) $3(s^2 + 5s + 4)^2 \cdot (2s + 5)$

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6. If $f(x) = |x - 1|$ find

$$\lim_{h \to 0} \frac{f(1 + h) - f(1)}{h}$$

Possibilities:

(a) 3
(b) -3
(c) 1
(d) -1
(e) Does not exist

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7. If $f(x) = (x+6)^2$, find

$$\frac{f(x+h) - f(x)}{h}$$

Possibilities:

(a) $2x + 2h + 12$

(b) $2x + h - 2$

(c) $2x + 2h + 2$

(d) $2x + h + 12$

(e) $2x + h - 12$

---

8. Find $Y'(s)$ if $Y(s) = \frac{1}{4s^2} - \frac{5}{s}$.

Possibilities:

(a) $\frac{5}{2}s^{-3} + s^{-2}$

(b) $-\frac{1}{2}s^{-3} + 5s^{-2}$

(c) $-\frac{2}{5}s^{-3} + s^{-2}$

(d) $\frac{1}{2}s^{-3} + 5s^{-2}$

(e) $-2s^{-3} - 3s^{-2}$

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9. Suppose $k(s) = s^2 + 3s + 1$. Find a value c in the interval $[1, 3]$ such that $k'(c)$ equals the average rate of change of $k(s)$ on the interval $[1, 3]$.

Possibilities:

(a) -1

(b) 0

(c) 1

(d) 2

(e) 3

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10. Suppose $h(x) = [f(x)]^2$ and the equation of the tangent line to the graph of $f(x)$ at $x = 1$ is $y = 3 + 4(x - 1)$. Find $h'(1)$.

Possibilities:

(a) 28

(b) 40

(c) 14

(d) 24

(e) 20

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11. Let

$$G(x) = \begin{cases} (x-3)+6 & \text{if } x \geq 3 \\ -(x-3)+6 & \text{if } x < 3 \end{cases}$$

Find the minimum of $G(x)$ on the interval $[-10, 10]$.

Possibilities:

(a) 3

(b) 1

(c) -6

(d) 19

(e) 6

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12. Suppose that a function $f(x)$ has derivative $f'(x) = x^2 + 1$. Which of the following statements is true about the graph of $y = f(x)$?

Possibilities:

(a) The function is increasing on $(-\infty, \infty)$.

(b) The function is decreasing on $(-\infty, \infty)$.

(c) The funtion is increasing on $(-\infty, -1)$ and $(1, \infty)$, and the function is decreasing on $(-1, 1)$.

(d) The function is increasing on $(-\infty, 0)$, and the function is decreasing on $(0, \infty)$.

(e) The function is decreasing on $(-\infty, 0)$, and the function is increasing on $(0, \infty)$.

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13. Suppose $u(t)$ and $w(t)$ are differentiable for all t and the following values of the functions and derivatives are known: $u(7) = 2$, $u'(7) = -1$, $w(7) = 1$, and $w'(7) = 9$. Find the value of $h'(7)$ when

$$h(t) = \frac{w(t) + 5}{u(t)}.$$

Possibilities:

(a) 3
(b) 6
(c) -3
(d) 12
(e) -6

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14. Suppose that a function $h(x)$ has derivative $h'(x) = x^2 + 4$. Find the x value in the interval $[-1, 3]$ where $h(x)$ takes its minimum.

Possibilities:

(a) -1
(b) 3
(c) 5
(d) 13
(e) 29

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15. Let $f(x) = 2^x$. Use a calculator and the definition of the derivative as a limit to estimate the value of $f'(1)$.

Possibilities:

(a) 1.386
(b) 2.296
(c) 4.768
(d) 5.545
(e) 8.047
