MA 123 — Elementary Calculus Spring 2010
SECOND MIDTERM EXAM 03/10/2010

Name: _____ **Sec.:** _____

Do not remove this answer page — you will return the whole exam. You will be allowed two hours to complete this test. 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:

number of correct problems	**(out of 15)**
Total	**(out of 100 pts)**

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

Section #	Instructor	Lectures
001	M. Shaw	MWF 12:00 pm - 12:50 pm, CP 153
002	T. Chapman	MWF 2:00 pm - 2:50 pm, CP 139
003	P. Koester	TR 12:30 pm - 1:45 pm, CP 153
004	M. Shaw	MWF 9:00 am- 9:50 am, BS 116
005	P. Koester D. Moore	MWF 1:00 pm - 1:50 pm, CB 122 T 11:00 am - 12:15, CB 303
006	P. Koester J. Polly	MWF 1:00 pm - 1:50 pm, CB 122 R 11:00 am - 12:15, DH 301
007	P. Koester D. Moore	MWF 1:00 pm - 1:50 pm, CB 122 T 9:30 am - 10:45, CB 243
008	P. Koester J. Polly	MWF 1:00 pm - 1:50 pm, CB 122 R 9:30 am - 10:45, CB 243
009	D. Leep A. Barra	MWF 10:00 am - 10:50 am, CP 320 T 1:00 pm - 2:15, CP 397
010	D. Leep A. Barra	MWF 10:00 am - 10:50 am, CP 320 R 1:00 pm - 2:15, CB 304
011	D. Leep A. Barra	MWF 10:00 am - 10:50 am, CP 320 T 2:30 pm - 3:45, CP 246
012	D. Leep A. Barra	MWF 10:00 am - 10:50 am, CP 320 R 2:30 pm - 3:45, CP 235
013	A. Corso	MWF 12:00 pm - 12:50 pm, CB 110
401	D. Little	TR 6:00 pm-7:15 pm, CB 339
402	D. Little	TR 7:30 pm-8:45 pm, 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.

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1. Find the instantaneous rate of change of $h(x)$ at $x = 4$, where

$$h(x) = \sqrt{73 - x^3}$$

Possibilities:

(a) -8
(b) -6
(c) -4
(d) 2
(e) 4

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2. Suppose

$$\frac{f(x+h) - f(x)}{h} = \frac{3h^2 - 4xh}{h\sqrt{x^2+8}}$$

Find the slope of the tangent line to $y = f(x)$ at $x = 1$

Possibilities:

(a) 0
(b) $\dfrac{3h-4}{3}$
(c) $-\dfrac{1}{9}h + \dfrac{32}{27}$
(d) $-\dfrac{4}{9}$
(e) $-\dfrac{4}{3}$

---

3. Suppose $f(x) = (x-6)^2$ and

$$\frac{f(x+h) - f(x)}{h} = Ax + Bh + C$$

for some numbers A, B, and C. Determine C.

Possibilities:

(a) -6
(b) 6
(c) 0
(d) -12
(e) 12

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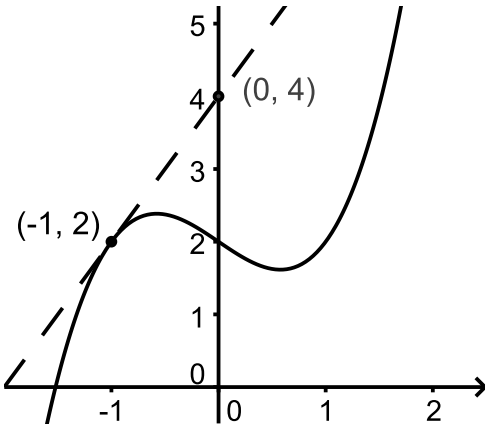
4. The graph of the function $f(x)$ (solid) and its tangent line (dotted line) at $x = -1$ are given. Find $f'(-1)$.



Possibilities:

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

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5. The tangent line to the graph of $g(x)$ at $x = -1$ is given by $y = 4(x + 1) + 7$. Suppose

$$F(x) = x^3\, g(x)$$

Find $F'(-1)$.

Possibilities:

(a) 25
(b) 17
(c) -4
(d) 4
(e) -17

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6. Let $h(x) = 7 + \ln(x^2 - 3x - 3)$. Find the equation of the tangent line to $h(x)$ at $x = 4$.

Possibilities:

(a) $y = \dfrac{1}{4}\,x + 6$
(b) $y = \dfrac{1}{4}\,x + 4$
(c) $y = 5x - 13$
(d) $y = x + 4$
(e) $y = 5x - 12$

---

7. Find $g'(2)$ where

$$g(x) = \frac{x+2}{x^2+1}$$

Possibilities:

(a) $\frac{11}{25}$

(b) $-\frac{11}{25}$

(c) $\frac{11}{5}$

(d) $-\frac{11}{5}$

(e) $\frac{3}{5}$

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8. Let $F(x) = e^{8x}$. Find the 10th derivative, $F^{(10)}(x)$.

Possibilities:

(a) e^{8x}

(b) 0

(c) e^{80}

(d) $10^8 e^{8x}$

(e) $8^{10} e^{8x}$

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9. $f(x) = x + e^{-x}$. Find $f'(30)$.

Possibilities:

(a) $1 - 30e^{-31}$

(b) $1 - 30e^{-29}$

(c) $1 - e^{-30}$

(d) $1 + e^{-30}$

(e) $1 + 30e^{-30}$

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10. Suppose $G(x) = h(4x)$, and $h(3) = 2$, $h'(3) = -3$, $h(4) = 4$, $h'(4) = 6$, $h(12) = 8$, and $h'(12) = -1$. Find $G'(3)$.

Possibilities:

(a) -8

(b) -4

(c) -1

(d) 6

(e) 8

---

11. $Q(t) = t^3$. Find a number c in the interval $(1, 3)$ so that the average rate of change of $Q(t)$ on $[1, 3]$ is equal to the instantaneous rate of change at $t = c$.

Possibilities:

(a) $\sqrt{13}$

(b) $\dfrac{2}{\sqrt{3}}$

(c) $\sqrt{\dfrac{13}{2}}$

(d) $\dfrac{13}{3}$

(e) $\sqrt{\dfrac{13}{3}}$

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12. Find the number c in the interval $[-2, 3]$ so that the minimum of $f(x) = x^3 - 6x^2 - 15x - 4$ on the interval $[-2, 3]$ occurs at $x = c$.

Possibilities:

(a) -104

(b) -76

(c) -1

(d) 3

(e) 5

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13. Suppose

$$g(x) = \begin{cases} 2x^2, & x \leq 0 \\ 4x, & x > 0 \end{cases}$$

Find the maximum value of $g(x)$ on the interval $[-4, 2]$.

Possibilities:

(a) $f(x)$ does not have a maximum on $[-4, 2]$

(b) -4

(c) 8

(d) 32

(e) 38

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14. How much money must be invested now in order to have $\$3,000$ in 5 years, assuming interest is compounded continuously at an annual rate of 6%?

Possibilities:

(a) $3000\, e^{-0.3}$

(b) $3000\, e^{-3}$

(c) $3000\, e^{-30}$

(d) $3000\, e^{0.3}$

(e) $3000\, (1.06)^{-5}$

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15. Suppose $g(x) = a\, e^{bx}$ for some constants a and b. Suppose $(0, 2)$ is on the graph of $y = g(x)$. Also, suppose $g'(0) = -6$. Find $g(1)$.
(Hint: use the two given conditions to determine a and b, then find $g(1)$.)

Possibilities:

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

(b) $2e^{3}$

(c) $-2e^{6}$

(d) -6

(e) 1
