MA 123 — Elem. Calculus Spring 2012
EXAM 2 3/7/2012

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 multiple choice questions. Record your answers on this page. For each multiple choice question, you will need to fill 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 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]

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

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

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

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

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

For grading use:

Number Correct	
	(out of 20 problems)

Total	
	(out of 100 points)

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. Your section number is determined by your recitation time and location.

Section #	**Instructor**	**Recitation**
001	D. Akers	T 8:00 am - 9:15 am, CB 243
002	D. Akers	R 8:00 am - 9:15 am, CB 243
003	D. Akers	T 12:30 pm - 1:45 pm, TEB 231
004	Q. Liang	R 9:30 am - 10:45 am, NURS 502A
005	Q. Liang	T 11:00 am - 12:15 pm, CB 243
006	Q. Liang	R 11:00 am - 12:15 pm, CB 243
007	D. Corral	T 2:00 pm - 3:15 pm, DH 301
008	D. Corral	R 2:00 pm - 3:15 pm, DH 301
009	D. Corral	T 11:00 am - 12:15 pm, DH 353
010	A. Barra	R 11:00 am - 12:15 pm, DH 353
011	A. Barra	T 12:30 pm - 1:45 pm, MMRB 243
012	A. Barra	R 12:30 pm - 1:45 pm, MMRB 243
013	J. Jung	T 11:00 am - 12:15 pm, TPC 113
014	J. Jung	R 11:00 am - 12:15 pm, TPC 113
015	F. Camacho	T 12:30 pm - 1:45 pm, CB 219
016	J. Jung	R 12:30 pm - 1:45 pm, CB 219
017	F. Camacho	T 2:00 pm - 3:15 pm, FB B8
018	F. Camacho	R 2:00 pm - 3:15 pm, TPC 212
019	S. Hamilton	T 3:30 pm - 4:45 pm, CP 345
020	S. Hamilton	R 3:30 pm - 4:45 pm, BE 301
021	S. Hamilton	T 2:00 pm - 3:15 pm, CB 340
022	J. Constable	R 2:00 pm - 3:15 pm, CB 345
023	J. Constable	T 9:30 am - 10:45 am, L 201
024	J. Constable	R 9:30 am - 10:45 am, L 201
025	M. Shaw	MWF 9:00 am - 9:50 am, CB 110

You may use the following formula for the derivative of a quadratic function.

If $p(x) = Ax^2 + Bx + C$, then $p'(x) = 2Ax + B$.

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. Suppose $f(x) = \dfrac{9}{x+6}$. Find the value of A, given that

$$\frac{f(x+h)-f(x)}{h} = \frac{A}{(x+6)(x+h+6)}.$$

Possibilities:

(a) -11
(b) -10
(c) -9
(d) -8
(e) -7

---

2. Suppose

$$\frac{f(x+h)-f(x)}{h} = 3x+3h+7.$$

Determine the slope of the tangent to the graph of $y = f(x)$ at $x = 3$.

Possibilities:

(a) 12
(b) 13
(c) 14
(d) 15
(e) 16

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3. Find $f'(x)$ where

$$f(x) = \frac{1}{\sqrt[3]{x}}$$

.

Possibilities:

(a) $-\frac{1}{3}x^{-4/3}$

(b) $3x^2$

(c) $-3x^{-4}$

(d) $-\frac{1}{3}x^{-2/3}$

(e) $\frac{1}{(1/3)x^{-2/3}}$

---

4. Suppose $F(x) = \frac{f(x)}{g(x)}$, $f(3) = 10$, $g(3) = 3$, $f'(3) = 3$, $g'(3) = 10$. Find $F'(3)$.

Possibilities:

(a) $-91/9$

(b) $91/3$

(c) $91/9$

(d) $10/3$

(e) $-91/3$

---

5. Determine $H'(2)$, provided that $H(t) = (t^2 + 3t - 1)(t^2 - 3)$.

Possibilities:

(a) 1

(b) -29

(c) 43

(d) 7

(e) 0

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6. Find the derivative, $f\,'(3)$, where

$$f(x) = \sqrt{40 + x^2}$$

Possibilities:

(a) $1/7$
(b) $2/7$
(c) $3/7$
(d) $4/7$
(e) $5/7$

---

7. Suppose $F(G(x)) = x^3$ and $G'(2) = 3$. Determine $F'(G(2))$.

Possibilities:

(a) 3
(b) 12
(c) 4
(d) 1
(e) 6

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8. The tangent line to $y = f(x)$ at $x = 5$ is given by

$$y = -8(x - 5) + 11.$$

Determine the $f(5) + f'(5)$. (Hint: use the tangent line to determine each of $f(5)$ and $f'(5)$. Then add.

Possibilities:

(a) 3
(b) -29
(c) 8
(d) -5
(e) -11

---

9. Find the fourth derivative, $f^{(4)}(x)$, where

$$f(x) = 2x^5 - 9x^2$$

Possibilities:

(a) $1250x^5$

(b) $28x - 18$

(c) $240x$

(d) $1250x$

(e) $28x$

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10. Find the derivative, $f'(t)$, where

$$f(t) = e^{t^2+4t+7}$$

Possibilities:

(a) $(2t + 4)e^{t^2+4t+7}$

(b) e^{2t+4}

(c) $\ln(t^2 + 4t + 7)$

(d) e^{t^2+4t+7}

(e) $(t^2 + 4t + 7)e^{t^2+4t+6}$

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11. Find the derivative, $f'(x)$, where

$$f(x) = \ln(x^2 + 4x + 3)$$

Possibilities:

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

(b) $\dfrac{1}{x^2 + 4x + 3}$

(c) $\dfrac{2x + 4}{x^2 + 4x + 3}$

(d) $2x + 4$

(e) $\dfrac{x^2 + 4x + 3}{2x + 4}$

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12. Find the derivative, $f'(38)$, where

$$f(x) = x^2 + e^{-x}$$

Possibilities:

(a) $76 - 38e^{-37}$

(b) $76 + e^{-38}$

(c) $76 - e^{-38}$

(d) $76 + 38e^{-38}$

(e) $76 - 38e^{-39}$

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13. Find the 12th derivative, $f^{(12)}(x)$, where

$$f(x) = e^{3x}$$

Possibilities:

(a) 0

(b) $3^{12}e^{3x}$

(c) $12e^{3x}$

(d) 12^3e^{3x}

(e) $3e^{3x-1}$

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14. How much money must be invested now in order to have $\$5000$ in 6 years, assuming interest is compounded continuously at an annual rate of 7.5 % ?

Possibilities:

(a) $5000\, e^{0.450}$

(b) $5000\, e^{45.0}$

(c) $5000\, e^{-0.450}$

(d) $5000\, e^{-45.0}$

(e) $5000\, (1 + 0.08)^{-6}$

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15. The population of a certain country doubles every 21 years. If we express the population as $P(t) = P_0 e^{r \cdot t}$, then find r.

Possibilities:

(a) $\dfrac{\ln(2)}{21}$

(b) $\dfrac{21}{\ln(2)}$

(c) $\dfrac{2}{\ln(21)}$

(d) $\dfrac{\ln(21)}{2}$

(e) $21 \cdot \ln(2)$

---

16. Find the maximum value of $f(x)$ on $[0, 4]$ where $f(x) = 2x^3 - 3x^2 - 12x$.

Possibilities:

(a) Maximum value = 32

(b) Maximum value = 4

(c) Maximum value = 0

(d) Maximum value = -20

(e) Maximum value = 7

---

17. For which value of x does $f(x) = 1 + 2x + 3x^2 + 4x^3 + 5x^4$ attain it maximum value, on the interval $[2, 6]$?

Possibilities:

(a) Maximum value attained at $x = 3$

(b) Maximum value attained at $x = 2$

(c) Maximum value attained at $x = 6$

(d) Maximum value attained at $x = 4$

(e) $f(x)$ does not attain a maximimum value on $[2, 6]$

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18. According to the Extreme Value Theorem, which of the functions are guaranteed to attain a maximum value on the given interval?

(I) A continuous function on $(-\infty, \infty)$

(II) A continuous function on $[-1, 3]$

(III) A continuous function on $[0, 9]$

Possibilities:

(a) Only (II) is guaranteed to have a maximum and a minimum.

(b) (II) and (III) are guaranteed to have maxima and minima

(c) Only (I) is guaranteed to have a maximum and a minimum.

(d) Only (III) is guaranteed to have a maximum and a minimum.

(e) (I) and (III) are guaranteed to have maxima and minima

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19. Let $f(x) = x^2 + 9$. Find a value c between $x = 4$ and $x = 8$ so that the average rate of change of $f(x)$ from $x = 4$ to $x = 8$ is equal to the instantaneous rate of change of $f(x)$ at $x = c$.

Possibilities:

(a) 4

(b) 5

(c) 6

(d) 7

(e) 8

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20. Suppose $g(x) = 2x^3$ and the tangent line to $y = f(x)$ at $x = 2$ is given by $y = 5(x - 2) + 5$. Determine the slope of tangent line to $y = f(x) \cdot g(x)$ at $x = 2$

Possibilities:

(a) 200

(b) 80

(c) 29

(d) 21

(e) 120
