MA 123 — Elem. Calculus Fall 2011
EXAM 2 10/19/2011

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**	**Lectures**
001	L. Graham	T 8:00 am - 9:15 am, CB 243
002	X. Kong	T 9:30 am - 10:45 am, CP 208
003	X. Kong	T 11:00 am - 12:15 pm, CB 219
004	L. Graham	T 12:30 pm - 1:45 pm, DH 135
005	X. Kong	T 2:00 pm - 3:15 pm, DH 353
006	L. Graham	T 3:30 pm - 4:45 pm, CB 341
007	T. Kyriopoulos	R 8:00 am - 9:15 am, CB 243
008	N. Armenoff	R 9:30 am - 10:45 am, DH 323
009	N. Armenoff	R 11:00 am - 12:15 pm, L 213
010	T. Kyriopoulos	R 12:30 pm - 1:45 pm, CB 247
011	N. Armenoff	R 2:00 pm - 3:15 pm, DH 353
012	T. Kyriopoulos	R 3:30 pm - 4:45 pm, CB 341
013	C. Taylor	T 8:00 am - 9:15 am, CB 241
014	C. Taylor	T 9:30 am - 10:45 am, CB 338
015	J. Jung	T 11:00 am - 12:15 pm, CB 347
016	C. Taylor	T 12:30 pm - 1:45 pm, OHR 226
017	J. Jung	T 2:00 pm - 3:15 pm, CB 233
018	J. Jung	T 3:30 pm - 4:45 pm, CB 303
019	T. Brewer	R 8:00 am - 9:15 am, CB 341
020	R. May	R 9:30 am - 10:45 am, CP 208
021	T. Brewer	R 11:00 am - 12:15 pm, CB 219
022	T. Brewer	R 12:30 pm - 1:45 pm, DH 135
023	R. May	R 2:00 pm - 3:15 pm, CB 233
024	R. May	R 3:30 pm - 4:45 pm, CB 214

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. The equation of the tangent line to $y = f(x)$ at $x = 4$ is

$$y - 3 = 7(x - 4)$$

Determine $f(4)$ and $f'(4)$

Possibilities:

(a) $f(4) = 3$ and $f'(4) = 7$
(b) $f(4) = 4$ and $f'(4) = 3$
(c) $f(4) = 3$ and $f'(4) = 4$
(d) $f(4) = 7$ and $f'(4) = 4$
(e) $f(4) = 7$ and $f'(4) = 3$

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2. Suppose that

$$\frac{f(x+h) - f(x)}{h} = \frac{3(x+7)^2h + 3(x+7)h^2 + h^3}{h}$$

Find the derivative, $f\,'(2)$.

Possibilities:

(a) 241
(b) 242
(c) 243
(d) 244
(e) The derivative does not exist.

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3. $f(x) = (x+4)^2$. Find the value of C, given that

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

Possibilities:

(a) 5
(b) 6
(c) 7
(d) 8
(e) 9

---

4. Find the derivative, $f'(x)$, of

$$f(x) = \frac{1}{x^4}$$

Possibilities:

(a) $4x^3$
(b) $(1/4)\,x^5$
(c) $-4x^{-3}$
(d) $-4x^{-5}$
(e) $(1/4)\,x^3$

---

5. Suppose $f(4) = -5$, $f'(4) = 3$, $g(4) = 2$, and $g'(4) = 8$.
Find $F'(4)$, given that

$$F(x) = f(x)g(x)$$

Possibilities:

(a) -34
(b) 25
(c) 14
(d) 1
(e) There is not enough information to find the requested derivative.

---

6. Find the derivative, $f'(5)$, where

$$f(x) = \frac{x+3}{x+5}$$

Possibilities:

(a) $1/5$
(b) $-1/50$
(c) $-1/5$
(d) 1
(e) $1/50$

---

7. Find the derivative, $f\,'(7)$, where

$$f(x) = \sqrt{72 + x^2}$$

Possibilities:

(a) $5/11$
(b) $6/11$
(c) $7/11$
(d) $8/11$
(e) $9/11$

---

8. Find the second derivative, $f\,''(x)$, where $f(x) = (3x+3)^6$.

Possibilities:

(a) $30\,(3x+3)^4$
(b) $90\,(3x+3)^4$
(c) $324\,(3x+3)^4$
(d) $18\,(3x+3)^5$
(e) $270\,(3x+3)^4$

---

9. Find the 8^{th} derivative, $f^{(8)}(x)$, where

$$f(x) = e^{12x}$$

Possibilities:

(a) $8^{12}e^{12x}$

(b) e^{96}

(c) 0

(d) e^{12x}

(e) $12^{8}e^{12x}$

---

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

$$f(x) = 5x^2\, e^x$$

Possibilities:

(a) $2x\, e^x$

(b) $10x\, e^{x-1}$

(c) $10x\, e^x$

(d) $10x\, e^x + 5x^2\, e^x$

(e) $2x\, e^x + 5x^2\, e^{x-1}$

---

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

$$f(x) = \ln\left(5x^2 + 3x + 7\right)$$

Possibilities:

(a) $\dfrac{10x+3}{5x^2+3x+7}$

(b) $\dfrac{1}{10x+3}$

(c) $\dfrac{5x^2+3x+7}{10x+3}$

(d) $10x+3$

(e) $\dfrac{1}{5x^2+3x+7}$

---

12. Find the derivative, $f'(x)$, of

$$f(x) = (x+7)\,(x+8)\,(x+3)$$

Possibilities:

(a) $(x+7) + (x+8) + (x+3)$

(b) $(x+8)\,(x+3) + (x+7)\,(x+3) + (x+7)\,(x+8)$

(c) $(x+7)^2\,(x+8)^2\,(x+3)^2$

(d) 1

(e) $(x+7) - (x+8) - (x+3)$

---

13. Suppose $v(t) = w(t^2+1)$, $w'(26) = 13$, and $w'(5) = -5$. Find $v'(5)$

Possibilities:

(a) -25

(b) 10

(c) -130

(d) 130

(e) There is not enough information to find the requested derivative.

---

14. Find the derivative of $f(x)$, where

$$f(x) = \ln(x^3)$$

Possibilities:

(a) $f'(x) = \ln(x)/x^3$

(b) $f'(x) = 3/x^3$

(c) $f'(x) = 3\,\ln(x)$

(d) $f'(x) = 3/x$

(e) $f'(x) = 1/x^3$

---

15. Let $f(x) = x^2 - 4$. Find a value c between $x = 3$ and $x = 7$ so that the average rate of change of $f(x)$ from $x = 3$ to $x = 7$ is equal to the instantaneous rate of change of $f(x)$ at $x = c$.

Possibilities:

(a) 1

(b) 2

(c) 3

(d) 4

(e) 5

---

16. Find the minimum value of $f(x)$ on $[-4, 4]$ where $f(x) = |x - 2| + 17$.

Possibilities:

(a) 2

(b) 19

(c) 4

(d) 23

(e) 17

---

17. Find the maximum value of $f(x)$ on $[0, 4]$ where $f(x) = 2x^3 - 3x^2 - 12x - 1$.

Possibilities:

(a) Maximum value = 2

(b) Maximum value = 31

(c) Maximum value = 6

(d) Maximum value = 0

(e) Maximum value = -1

---

18. How much money must be invested now in order to have $\$5000$ in 5 years, assuming interest is compounded continuously at an annual rate of 8.0 % ?

Possibilities:

(a) $5000\,(1+0.08)^{-5}$

(b) $5000\,e^{-40.0}$

(c) $5000\,e^{-0.400}$

(d) $5000\,e^{40.0}$

(e) $5000\,e^{0.400}$

---

19. The number of a bacteria in a culture doubles every 14 hours. How many hours will it take before 4 times the original amount is present?

Possibilities:

(a) 28 hours

(b) 56 hours

(c) $(14/\ln(4))$ hours

(d) 42 hours

(e) $14\ \ln(4)$ hours

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20. The tangent line to $y=f(x)$ at $x=4$ is given by $y=6x-4$.
The tangent line to $y=g(x)$ at $x=4$ is given by $y=2x-2$.
Determine the slope of the tangent line to $h(x)$ at $x=4$, provided that $h(x)=f(x)+g(x)$.

Possibilities:

(a) -8

(b) 0

(c) -4

(d) 8

(e) -10
