MA 123 — Elem. Calculus	Fall 2011		
EXAM 1	9/21/2011	**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   11. a b c **d** e

2. a b **c** d e   12. a **b** c d e

3. a b c **d** e   13. a b **c** d e

4. a b **c** d e   14. a b c **d** e

5. a b c **d** e   15. a b c d **e**

6. a b **c** d e   16. a b c d **e**

7. a b c d **e**   17. a b c d **e**

8. a **b** c d e   18. **a** b c d e

9. a b **c** d e   19. a **b** c d e

10. **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

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

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

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.

1. Find the slope of the line in the graph shown below.

Possibilities:

(a) -5

(b) $-5/3$

(c) $3/5$

(d) $-3/5$

(e) $5/3$
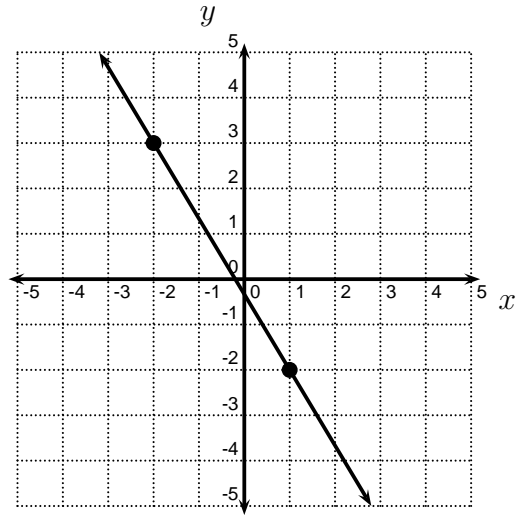
2. FInd A if

$$8x^2 + 8x + 3 = A + B\,(x - 1) + C\,(x - 1)(x - 2).$$

Possibilities:

(a) 17

(b) 18

(c) 19

(d) 20

(e) 21

3. Solve the inequality

$$x^2 - 7x + 6 < 0$$

Possibilities:

(a) $x < 1$ or $x > 6$

(b) $-6 < x < -1$

(c) $x > 3$

(d) $1 < x < 6$

(e) $x < -6$ or $x > -1$

4. A train travels from city A to city B, then travels from city B to city C. The train leaves city A at time 11:00 am and arrives at city B at 12:30 pm. The train leaves city B at 12:30 pm and arrives at city C three hours later. The average velocity of the train, while travelling from A to B, was 87 miles per hour. The distance between city B and city C is 90 miles. What is the average velocity of the train from city A to city C?

Possibilities:

(a) 50 miles per hour

(b) 48 miles per hour

(c) 49 miles per hour

(d) $(2031/43)$ miles per hour

(e) 117 miles per hour

5. Find the average rate of change of $f(x) = 10x^2 + 4$ from $x = 2$ to $x = 2 + h$.

Possibilities:

(a) $-40 - 10h$

(b) $-40h - 10h^2$

(c) h

(d) $40 + 10h$

(e) $40h + 10h^2$

6. Find a value of t so that the average rate of change of $f(t) = 3t^2 - 4t$ from 0 to t equals -1.

Possibilities:

(a) $t = -1$

(b) $t = 0$

(c) $t = 1$

(d) $t = 2$

(e) $t = 3$

7. Find a value of t so that the instantaneous rate of change of $f(t) = 2t^2 + t$ at t is equal to 17.

   Possibilities:

   (a) $t = 0$

   (b) $t = 1$

   (c) $t = 2$

   (d) $t = 3$

   (e) $t = 4$

8. Find the slope of the tangent line to the graph of

$$f(x) = 3x^2 - 2x - 6$$

   at $x = 8$

   Possibilities:

   (a) $46 + 3h$

   (b) 46

   (c) 170

   (d) 22

   (e) 40

9. The height of a ball is given by
$$h(t) = -16t^2 + 40t$$

   where t is measured in seconds and h is measured in feet above the ground.
   Find the TIME when the speed is zero.

   Possibilities:

   (a) $3/4$ seconds

   (b) 1 second

   (c) $5/4$ seconds

   (d) $3/2$ seconds

   (e) $7/4$ seconds

10. For the function $f(x) = 2x^2 + 10$ find the equation of the tangent line at $x = 7$.

   Possibilities:

   (a) $y = 28x - 88$

   (b) $y = 28x - 87$

   (c) $y = 28x - 86$

   (d) $y = 28x - 85$

   (e) $y = 28x - 84$

11. Compute
$$\lim_{t \to 0} \left(\frac{2}{t} + \frac{8t - 2}{t} \right)$$

   Possibilities:

   (a) 5

   (b) 6

   (c) 7

   (d) 8

   (e) The limit does not exist.

12. Compute $\lim\limits_{t \to 6} \dfrac{t^2 - 5t - 6}{t^2 - 4t - 12}$

   Possibilities:

   (a) 3/4

   (b) 7/8

   (c) 1

   (d) 9/8

   (e) The limit does not exist.

13. Compute $\lim\limits_{t \to 6} \dfrac{t^2 - 5t - 6}{t^2 + 5t + 4}$

   Possibilities:

   (a) -2
   (b) -1
   (c) 0
   (d) 1
   (e) The limit does not exist.

14. Compute $\lim\limits_{t \to -4^+} \dfrac{|3t + 12|}{t + 4}$

   Possibilities:
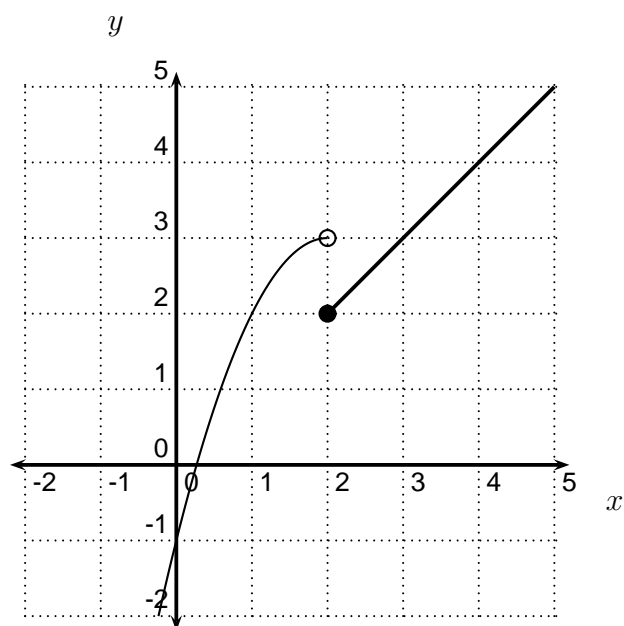
   (a) 1
   (b) -3
   (c) -1
   (d) 3
   (e) 0

15. Which of the following statements are true?

   (I) $f(2) = 2$
   (II) $\lim\limits_{x \to 2^-} f(x) = 2$
   (III) $\lim\limits_{x \to 2^+} f(x) = 2$

   Possibilities:

   (a) Only (I) and (II) are true
   (b) Only (I) is true
   (c) Only (III) is true
   (d) Only (II) is true
   (e) Only (I) and (III) are true
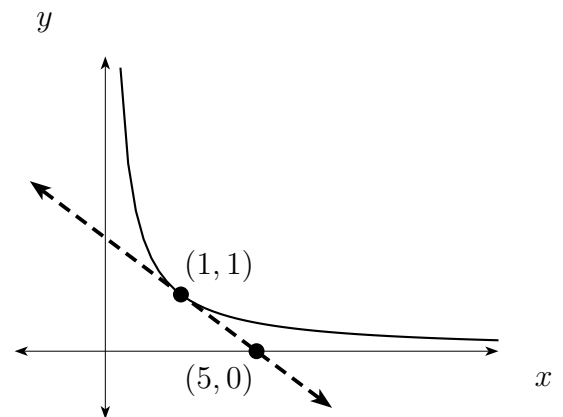
16. Which of the following is the correct expression for the derivative $g'(4)$?

   Possibilities:

   (a) $\dfrac{g(4) - g(4+h)}{h}$

   (b) $\lim\limits_{h\to 0} \dfrac{g(4-h) - g(4)}{h}$

   (c) $\lim\limits_{h\to 0} \dfrac{g(4) - g(4+h)}{h}$

   (d) $\dfrac{g(4+h) - g(4)}{h}$

   (e) $\lim\limits_{h\to 0} \dfrac{g(4+h) - g(4)}{h}$

17. The graph of $y = g(x)$ is shown (solid), as well as the tangent line to the graph (dotted) at $x = 1$. Determine $g'(1)$.

   Possibilities:

   (a) 5

   (b) $-1/2$

   (c) $1/5$

   (d) 1

   (e) $-1/4$

18. Suppose $f'(2) = 16$ and $f(2) = 7$. Find the equation to the tangent line to $y = f(x)$ at $x = 2$.

   Possibilities:

   (a) $y - 7 = 16(x - 2)$

   (b) $y - 2 = 16(x - 7)$

   (c) $y - 2 = 16x + 7$

   (d) $y + 7 = 16(x + 2)$

   (e) $y = 7x - 30$

19. Find the value of A which makes $f(x)$ continuous everywhere, where

$$f(x) = \begin{cases} x + A, & \text{if } x \le 2; \\ 5x^3 - 2, & \text{if } x > 2 \end{cases}$$

Possibilities:

(a) -2

(b) 36

(c) -2

(d) 38

(e) No such value of A exists

20. Find all values of x where the function

$$f(x) = \begin{cases} x^2 + 4x + 7, & \text{if } x \le -2; \\ 2 - x, & \text{if } -2 < x \le 2; \\ x - 2, & \text{if } x > 2 \end{cases}$$

is continuous but not differentiable

Possibilities:

(a) Only $x = -2$

(b) $f(x)$ is differentiable for all x.

(c) At $x = -2$ and $x = 2$

(d) Only $x = 2$

(e) None of the above