MA123 — Elem. Calculus   Fall 2014
Exam 1   2014-09-25

Name: _____ **Sec.:** _____

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GOOD LUCK!

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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.

Section	Instructor	Day	Time	Room
	Jack Schmidt	MWF	8:00 am - 8:50 am	FB 200
001	Nandita Sahajpal	Tu	8:00 am	FB B13
002	Nandita Sahajpal	Tu	9:30 am	NURS 501b
003	John Mosley	Tu	11:00 am	DH 353
004	John Mosley	Tu	12:30 pm	CB 337
005	John Mosley	Tu	2:00 pm	CB 233
006	John Mosley	Tu	3:30 pm	CB 341
	Jack Schmidt	MWF	9:00 am - 9:50 am	BS 107
007	Nandita Sahajpal	Th	8:00 am	TEB 207
008	Nandita Sahajpal	Th	9:30 am	TEB 231
009	Chad Linkous	Th	11:00 am	CP 111
010	Chad Linkous	Th	12:30 pm	CB 337
011	Bill Trok	Th	2:00 pm	CB 219
012	Bill Trok	Th	3:30 pm	CB 341
	erica Whitaker	MWF	1:00 pm - 1:50 pm	KAS 213
013	Dharma Maharjan	Tu	8:00 am	CP 397
014	Dharma Maharjan	Tu	9:30 am	NURS 511
015	Chad Linkous	Tu	11:00 am	FB B13
016	Chad Linkous	Tu	12:30 pm	CB 335
017	Bill Trok	Tu	2:00 pm	DH 301
018	Bill Trok	Tu	3:30 pm	CB 337
	erica Whitaker	MWF	3:00 pm - 3:50 pm	FB 200
019	Dharma Maharjan	Th	8:00 am	DH 203
020	Dharma Maharjan	Th	9:30 am	TEB 207
021	Kathy Effinger	Th	11:00 am	DH 353
022	Kathy Effinger	Th	12:30 pm	CB 335
023	Jonathan Thompson	Th	2:00 pm	FB B13
024	Jonathan Thompson	Th	3:30 pm	CB 303
401	Dustin Hedmark	MTR	5:30 pm - 6:45 pm	CB 343
402	Brad Fox	MTR	7:00 pm - 8:15 pm	CB 337

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

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

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 an equation for the line with slope 2 passing through the point $(x, y) = (7, 6)$.

   Possibilities:

   (a) $y = 2x - 8$

   (b) $y = 2x - 14$

   (c) $y = (6/7)x + 2$

   (d) $y = 2x + 6$

   (e) $y = 7x + 6$

2. Solve the equation $x^3 + 3xy + 6y = 8$ for y in terms of x

   Possibilities:

   (a) $y = \dfrac{x^3 - 8}{3x + 6}$

   (b) $y = \dfrac{8 - x^3}{3x + 6}$

   (c) $y = 8 - x^3 - 3x - 6$

   (d) $y = \dfrac{3x + 6}{8 - x^3}$

   (e) $y = \dfrac{3x + 6}{x^3 - 8}$

3. Find the point where the curve $y + 25 = (x - 7)^2$ intersects the y-axis.

   Possibilities:

   (a) $(24, 0)$

   (b) $(0, -24)$

   (c) $(0, 24)$

   (d) $(32, 0)$

   (e) $(-18, 0)$

4. Evaluate $f(5)$ when $f(x)$ is given by the piecewise definition

$$f(x) = \begin{cases} x^2 - 5 & \text{if } x \le 1 \\ 8x - 2 & \text{if } 1 < x \le 3 \\ x^2 - 4x & \text{if } 3 < x \end{cases}$$

Possibilities:

(a) -4

(b) 63

(c) 20

(d) 38

(e) 5

5. A train travels from city A to city B, then travels from city B to city C. The train leaves city A at time 11:00am and arrives at city B at 12:30pm. The train leaves city B at 2:00pm and arrives at city C at 5:00pm. The average velocity of the train, while travelling from A to B, was 54 miles per hour. The average velocity of the train, while travelling from B to C, was 58 miles per hour. What was the average velocity of the train from city A to city C, including the wait at city B?

Possibilities:

(a) 56 miles per hour

(b) $(87/2)$ miles per hour

(c) $(85/2)$ miles per hour

(d) 2 miles per hour

(e) 112 miles per hour

6. Find the average rate of change of $f(x) = \sqrt{x + 3}$ from $x = 6$ to $x = 46$.

Possibilities:

(a) $-\frac{8}{23}$

(b) 4

(c) $-\frac{1}{10}$

(d) $\frac{43}{46}$

(e) $\frac{1}{10}$

7. Find the average rate of change of $f(x) = 7x^2 + 5$ from $x = 3$ to $x = 3 + h$.

   Possibilities:

   (a) h

   (b) $-7h - 42$

   (c) $-7h^2 - 42h$

   (d) $7h + 42$

   (e) $7h^2 + 42h$

8. Find a value of x so that the instantaneous rate of change of $f(x) = 4x^2 + 8$ at x is equal to 48.

   Possibilities:

   (a) $x = 5$

   (b) $x = 6$

   (c) $x = 7$

   (d) $x = 8$

   (e) $x = 9$

9. Let $f(x) = 7x^2 + 4x + 5$. Find a value c between $x = 0$ and $x = 4$, so that the average rate of change of $f(x)$ from $x = 0$ to $x = 4$ is equal to the instantaneous rate of change of $f(x)$ at $x = c$.

   Possibilities:

   (a) 0

   (b) 1

   (c) 2

   (d) 3

   (e) 4

10. If $\lim\limits_{x \to 13} f(x) = 5$ and $\lim\limits_{x \to 13} g(x) = 3$, then what is the value of $\lim\limits_{x \to 13} \dfrac{(x+11)(f(x)+1)}{g(x)}$?

Possibilities:

(a) $\dfrac{(13+11)(5+1)}{3}$

(b) 0

(c) $\dfrac{(13)(5)}{3}$

(d) the limit is infinity or does not exist

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

11. Find the limit

$$\lim_{t \to 0^+} \frac{34\sqrt{t}}{t}$$

Possibilities:

(a) 34

(b) 0

(c) $\frac{17}{\sqrt{t}}$

(d) 17

(e) This limit either tends to infinity or this limit fails to exist

12. Find the limit

$$\lim_{x \to 0} \left(\frac{13}{x} + \frac{7x-13}{x} \right)$$

Possibilities:

(a) 7

(b) 0

(c) 1

(d) 13

(e) This limit does not exist.

13. Compute

$$\lim_{n \to \infty} \frac{3n^2 - 8n + 6}{7n^2 + 5n - 5}$$

If the limit tends to $\pm\infty$, select "Limit does not exist".

Possibilities:

(a) 3

(b) 0

(c) -8

(d) 3/7

(e) Limit does not exist

14. For the function

$$f(x) = \begin{cases} |5 + x| & \text{if } x < -2 \\ \sqrt{x^2 + 1} & \text{if } -2 \le x < 3 \\ 9x^2 + x + 2 & \text{if } 3 \le x \end{cases}$$
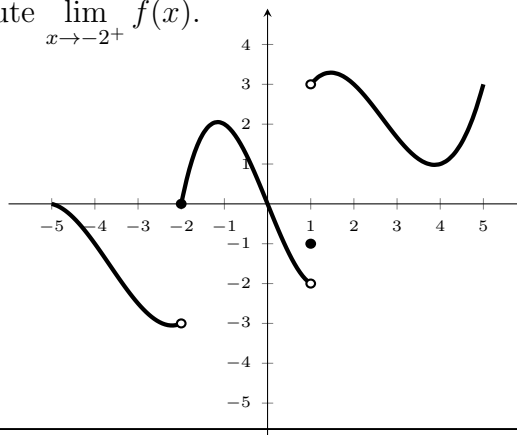
find $\lim_{x \to 4^+} f(x)$

Possibilities:

(a) 9

(b) 150

(c) 86

(d) $\sqrt{17}$

(e) $\sqrt{10}$

15. The graph of $y = f(x)$ is shown below. Compute $\lim_{x \to -2^+} f(x)$.

Possibilities:

(a) 3

(b) -2

(c) -1

(d) 0

(e) -3

7

16. Suppose $f(x) = Ax^3$ for $x < 2$ and $f(x) = 14 - Ax$ for $x \geq 2$. Find a value of A such that the function $f(x)$ is continuous at the point $x = 2$.

Possibilities:

(a) 1

(b) $\dfrac{6}{5}$

(c) $\dfrac{7}{5}$

(d) $\dfrac{8}{5}$

(e) $\dfrac{9}{5}$

17. Find the value of m which makes $f(x)$ differentiable everywhere, where n

$$f(x) = \begin{cases} x^2, & \text{if} \quad x \leq 2; \\ m\,(x-2) + 4, & \text{if} \quad x > 2 \end{cases}$$

Possibilities:

(a) 4

(b) 5

(c) 6

(d) 7

(e) 8

18. For the function $f(x) = 6x^2 + 5x + 9$, find the equation of the tangent line to graph of f at $x = -3$.

Possibilities:

(a) $y = 48x + 113$

(b) $y = x^3 + 17$

(c) $y = -31x + 48$

(d) $y = 48$

(e) $y = -31x - 45$

19. Determine the value of $f'(1)$ from the graph of $f(x)$ given here:

Possibilities:

(a) $f'(1) = -1$

(b) $f'(1) = 0$
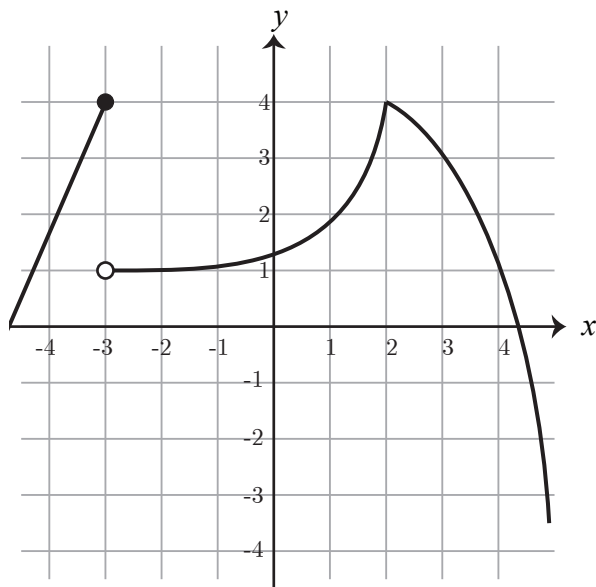
(c) $f'(1) = 1$

(d) $f'(1) = 3$

(e) $f'(1) = -3$
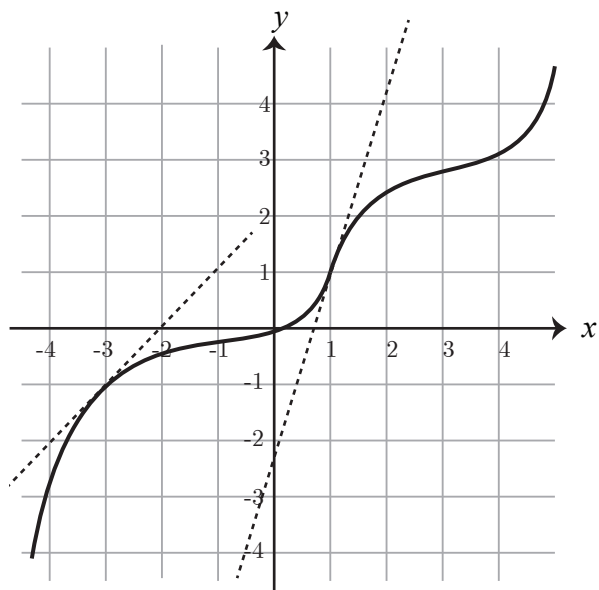
20. Determine the x values where the derivative is not defined (that is, the points where the function is not differentiable) on the function graphed here:

Possibilities:

(a) $x = -1$ and $x = 3$

(b) $x = -2$ and $x = 1$

(c) $x = -2$ and $x = 3$

(d) $x = -3$ and $x = 2$

(e) $x = -3$ and $x = 1$

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