MA123 — Elem. Calculus Spring 2016
Exam 1 2016-02-11

Name: _____ **Sec.:** _____

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GOOD LUCK!

3.	a	b	c	d	e	**12.**	a	b	c	d	e
4.	a	b	c	d	e	**13.**	a	b	c	d	e
5.	a	b	c	d	e	**14.**	a	b	c	d	e
6.	a	b	c	d	e	**15.**	a	b	c	d	e
7.	a	b	c	d	e	**16.**	a	b	c	d	e
8.	a	b	c	d	e	**17.**	a	b	c	d	e
9.	a	b	c	d	e	**18.**	a	b	c	d	e
10.	a	b	c	d	e	**19.**	a	b	c	d	e
11.	a	b	c	d	e	**20.**	a	b	c	d	e

For grading use:

Multiple Choice		Short Answer
(number right)	(5 points each)	(out of 10 points)

Total	
	(out of 100 points)

Spring 2016 Exam 1 Short Answer Questions

Write answers on this page. You must show appropriate legible work to be sure you will get full credit.

4 pts 1. Evaluate the one-sided limit $\lim_{x\to 0^-} \frac{|x|}{6x}$.

6 pts 2. Let $f(x) = x^2 + 3$. Find a value of x such that the **average rate of change** of $f(x)$ from 1 to x equals 12.

Name: _____

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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3. Solve the equation $t = r + \frac{k}{5}w$ for w

Possibilities:

(a) $w = \dfrac{5r - 5t}{k}$

(b) $w = \dfrac{k}{5t - 5r}$

(c) $w = \dfrac{5t}{r + k}$

(d) $w = \dfrac{t}{r + \dfrac{k}{5}}$

(e) $w = \dfrac{5t - 5r}{k}$

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

$$f(x) = \begin{cases} x^2 - 7 & \text{if } x \leq 3 \\ x - 2 & \text{if } 3 < x \leq 4 \\ x^2 - 5x & \text{if } 4 < x \end{cases}$$

Possibilities:

(a) -4

(b) 7

(c) 2

(d) 9

(e) DNE

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5. A train travels from city A to city B, then travels from city B to city C. The train leaves city A at 9:00am and arrives at city B at 11:00am. The train leaves city B at 11:00am and arrives at city C at 4:00pm. The average velocity of the train, while traveling from A to B, was 31 miles per hour. What was the average velocity of the train from city B to city C, given that the average velocity of the train while traveling from A to C was 54 miles per hour?

Possibilities:

(a) (85/2) miles per hour

(b) (316/5) miles per hour

(c) (321/5) miles per hour

(d) (23/2) miles per hour

(e) 85 miles per hour

6. If $f(x) = \sqrt{x+3}$ then choose the simplified form of $\frac{f(x+h)-f(x)}{h}$:

Possibilities:

(a) $\frac{1}{2}\sqrt{x+h+3} - \frac{1}{2}\sqrt{x+3}$

(b) 1

(c) $\dfrac{\frac{1}{2}}{\sqrt{x+h+3}}$

(d) $\dfrac{h\sqrt{x+3}+\frac{1}{2}}{\sqrt{x+3}}$

(e) $\dfrac{1}{\sqrt{x+h+3}+\sqrt{x+3}}$

7. Let $f(x) = 3x^2 + 4$. Find a value of x so that $f'(x) = 36$.

Possibilities:

(a) $x = 2$

(b) $x = 3$

(c) $x = 4$

(d) $x = 5$

(e) $x = 6$

8. Let $f(x) = 6x^2 + 4x + 3$. 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) 3

(b) 4

(c) 5

(d) 6

(e) 7

9. If $\lim_{x\to 13} f(x) = 11$ and $\lim_{x\to 13} g(x) = 7$, then what is the value of $\lim_{x\to 13} \dfrac{17f(x)+2}{x+g(x)}$?

Possibilities:

(a) 0

(b) $\dfrac{(17)11+2}{13+7}$

(c) the limit is infinity or does not exist

(d) $\dfrac{(17)(11)(13)+2}{13+(7)(13)}$

(e) $\dfrac{11}{7}$

10. Find the limit

$$\lim_{x\to 34} \frac{x^2-16}{x-34}$$

Possibilities:

(a) $\dfrac{16}{34}$

(b) 38

(c) 0

(d) 1

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

11. Find the limit

$$\lim_{x\to 0}\left(\frac{15}{x}+\frac{5x-15}{x}\right)$$

Possibilities:

(a) This limit does not exist.

(b) 15

(c) 0

(d) 5

(e) 1

12. Find the limit

$$\lim_{n\to\infty}\frac{(n+3)^2}{13n^2+11}$$

Possibilities:

(a) $\frac{1}{13}$

(b) The limit does not exist or approaches infinity

(c) $\frac{1}{24}$

(d) $\frac{9}{13}$

(e) $\frac{1}{11}$

13. For the function

$$f(x) = \begin{cases} |3+4x| & \text{if } x < -1 \\ \sqrt{x^2+4} & \text{if } -1 \le x < 2 \\ 9x^2+4x+8 & \text{if } 2 \le x \end{cases}$$

find $\lim_{x \to 3^+} f(x)$

Possibilities:

(a) $\sqrt{13}$

(b) $\sqrt{8}$

(c) 52

(d) 15

(e) 101

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

Possibilities:

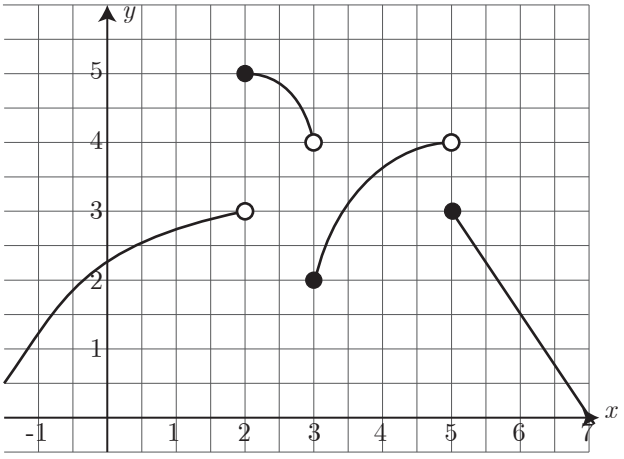
(a) 5

(b) 2

(c) The limit does not exist or approaches infinity

(d) 3

(e) 4



15. Consider the function $f(x) = \begin{cases} x^2 - 3 & \text{if } x < 4 \\ 2x + B & \text{if } x \geq 4 \end{cases}$

Find a value of B so that the function is continuous at $x = 4$.

Possibilities:

(a) 2

(b) 3

(c) 4

(d) 5

(e) 6

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

$$f(x) = \begin{cases} x^2, & \text{if } x \leq 3; \\ m\,(-3 + x) + 9, & \text{if } x > 3 \end{cases}$$

Possibilities:

(a) 6

(b) 7

(c) 8

(d) 9

(e) 10

17. Find the equation of the tangent line to the graph of the function $f(x) = \dfrac{1}{x^2+1} + 3$ at $x = 3$. You may use $f'(x) = -\dfrac{2x}{(x^2+1)^2}$

Possibilities:

(a) $y = \dfrac{31}{10}$

(b) $y = \dfrac{31}{10}x - \dfrac{234}{25}$

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

(d) $y = -\dfrac{3}{50}x + \dfrac{82}{25}$

(e) $y = -\dfrac{3}{50}x + \dfrac{31}{10}$

18. Consider the function $f(x) = 6x^2 + 4x + 5$. Its tangent line at $x = 4$ goes through the point $(8, y_1)$ where y_1 is:

Possibilities:

(a) 117

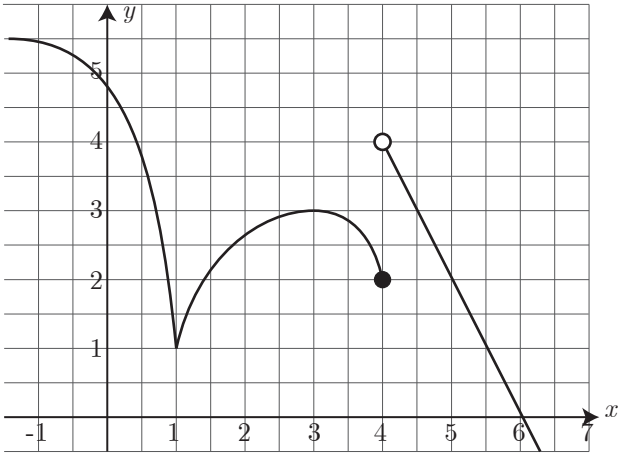
(b) 100

(c) 325

(d) 52

(e) -91

19. The graph of $y = f(x)$ is shown below. $f'(\frac{11}{2})$ is approximately :



Possibilities:

(a) -2

(b) 2

(c) The limit does not exist or tends to infinity

(d) $-\frac{1}{2}$

(e) $\frac{1}{2}$

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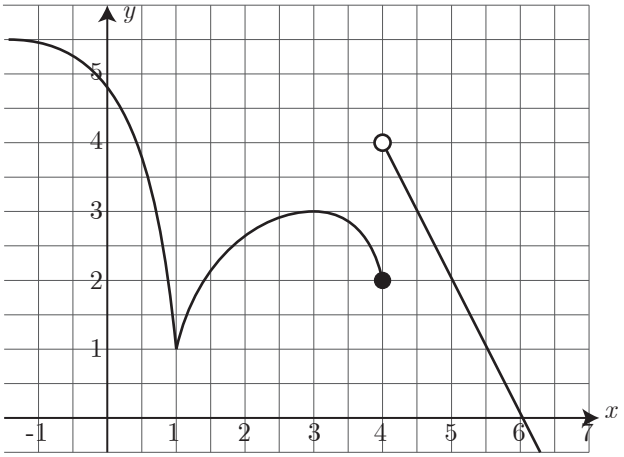
20. The graph of $y = f(x)$ is shown below. The function is differentiable, except at $x =$



Possibilities:

(a) x=4 only

(b) x=1 and x=4

(c) x=1, x=3, and x=4

(d) x=1 only

(e) x=1, x=3, x=4, and x=6

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