MA123 — Elem. Calculus Fall 2016
Exam 1 2016-09-22

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)

Name: **Last 4 digits of Student ID:**

Fall 2016 Exam 1 Short Answer Questions

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

1. Evaluate the limit $\lim_{x\to 3}\frac{x^2-2x-3}{x^2-3x}$.

2. Let $f(x)=3x^2+10x-4$. Find a value of x such that the **instantaneous rate of change** of $f(x)$ at x equals 28.

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

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

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

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

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

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

$$f(x) = \begin{cases} x^2 - 6 & \text{if } x \leq 2 \\ 7x - 3 & \text{if } 2 < x \leq 4 \\ x^2 - 9x & \text{if } 4 < x \end{cases}$$

Possibilities:

(a) -20

(b) 10

(c) 15

(d) DNE

(e) 25

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5. If $h(t)$ represents the height of an object in feet above ground level at time t seconds and $h(t)$ is given by $h(t) = -16t^2 + 21t + 157$, find the time at which the speed of the object is zero.

Possibilities:

(a) (21/16) seconds

(b) (157/32) seconds

(c) (21/32) seconds

(d) (53/32) seconds

(e) 157 seconds

6. If $f(x) = \dfrac{4}{x+8}$ then choose the simplified form of $\frac{f(x+h)-f(x)}{h}$:

Possibilities:

(a) $\dfrac{4}{(x+h+8)(x+8)}$

(b) $\dfrac{hx^2 + 16hx + 64h - 4}{(x+8)^2}$

(c) $-\dfrac{4}{(x+h+8)(x+8)}$

(d) $-\dfrac{4}{(x+h+8)^2}$

(e) $\dfrac{8x + 64 + 4h}{(x+h+8)(x+8)(2x+h)}$

7. Let $f(x) = 4x^2 + 2x + 12$. Find the slope of the tangent line to the graph of $y = f(x)$ at $x = 1$.

Possibilities:

(a) $m = 7$

(b) $m = 8$

(c) $m = 9$

(d) $m = 10$

(e) $m = 11$

8. Let $f(x) = x^2 + 2x + 4$. Find a value c between $x = 2$ and $x = 6$, so that the average rate of change of $f(x)$ from $x = 2$ to $x = 6$ 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

9. If $\lim_{x\to 17} f(x) = 11$ and $\lim_{x\to 17} g(x) = 5$, then what is the value of $\lim_{x\to 17} \dfrac{3f(x)+2}{x+g(x)}$?

Possibilities:

(a) $\dfrac{11}{5}$

(b) $\dfrac{(3)(11)(17)+2}{17+(5)(17)}$

(c) $\dfrac{(3)11+2}{17+5}$

(d) the limit is infinity or does not exist

(e) 0

10. Find the limit

$$\lim_{x\to 36} \frac{x^2-9}{x-36}$$

Possibilities:

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

(b) 1

(c) 0

(d) $\dfrac{9}{36}$

(e) 39

11. Find the one-sided limit

$$\lim_{t \to 0^-} \frac{|36t|}{t}$$

Possibilities:

(a) 0

(b) -36

(c) 36

(d) $\frac{18}{\sqrt{t}}$

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

12. Find the limit

$$\lim_{n \to \infty} \frac{(8n+3)^2}{13n^2+7}$$

Possibilities:

(a) $\frac{8}{13}$

(b) $\frac{9}{7}$

(c) $\frac{64}{13}$

(d) $\frac{64}{7}$

(e) The limit does not exist or approaches infinity

13. For the function

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

find $\lim_{x \to 6^+} f(x)$

Possibilities:

(a) 85

(b) $\sqrt{17}$

(c) $\sqrt{44}$

(d) 313

(e) 16

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

Possibilities:

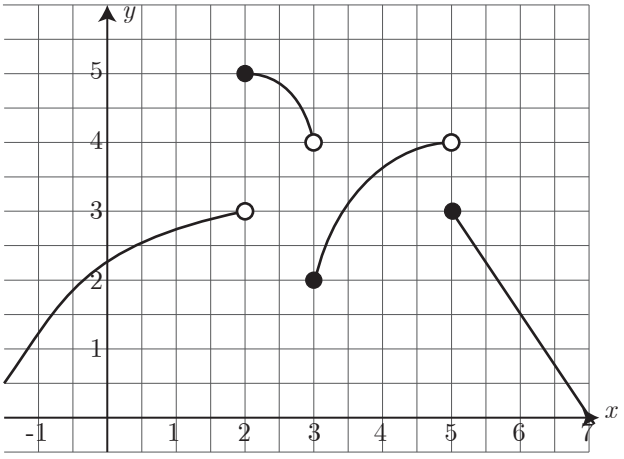
(a) The limit does not exist or approaches infinity

(b) 3

(c) 5

(d) 2

(e) 4



15. Consider the function $f(x) = \begin{cases} Ax^2 & \text{if } x < 3 \\ 13 - Ax & \text{if } x \geq 3 \end{cases}$

Find a value of A so that the function is continuous at $x = 3$.

Possibilities:

(a) $\frac{3}{4}$

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

(c) $\frac{11}{12}$

(d) 1

(e) $\frac{13}{12}$

16. Find all values of x where the derivative is not defined for $f(x) = |x^2 - 8x + 15|$.

Possibilities:

(a) x = -8 only

(b) x = 0 and x = 15

(c) x = 15 only

(d) x = -8 and x = 15

(e) x = 3 and x = 5

17. Find the equation of the tangent line to the graph of the function $f(x) = \dfrac{1}{x^2+1} + 4$ at $x = 3$. You may use $f'(x) = -\dfrac{2x}{(x^2+1)^2}$

Possibilities:

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

(b) $y = -\dfrac{3}{50}x + \dfrac{107}{25}$

(c) $y = -\dfrac{3}{50}x + \dfrac{41}{10}$

(d) $y = \dfrac{41}{10}$

(e) $y = \dfrac{41}{10}x - \dfrac{309}{25}$

18. Consider the function $f(x) = 2x^2 + 3x + 5$. Its tangent line at $x = 3$ goes through the point $(6, y_1)$ where y_1 is:

Possibilities:

(a) 77

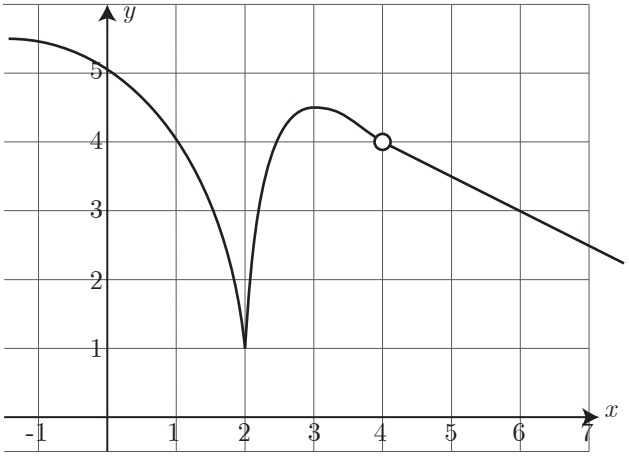
(b) 27

(c) 32

(d) 15

(e) -13

19. The graph of $y = f(x)$ is shown below. $f'(6)$ is approximately :



Possibilities:

(a) 2

(b) 3

(c) -2

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

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

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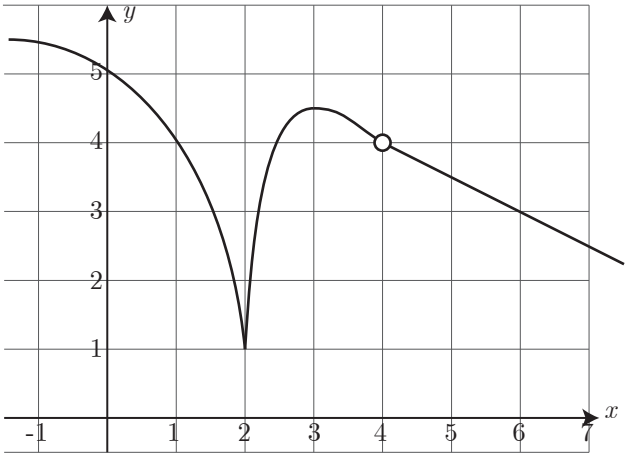
20. The graph of $y = f(x)$ is shown below. The function is continuous, except at $x =$



Possibilities:

(a) x = 2 only

(b) x = 2 and x = 4

(c) x = 4 only

(d) x = 2, x = 3, and x = 4

(e) x = 3 and x = 4

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