

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 do 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!

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|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 11. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |
| 2. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 12. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |
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| 4. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 14. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |
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| 7. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 17. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |
| 8. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 18. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |
| 9. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 19. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |
| 10. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 20. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |

For grading use:

Total	
	(out of 100 pts)

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. If you are enrolled in a lecture with recitation, then your section number is determined by your recitation time and location.

Section #	Instructor	Lectures
001	T. Chapman	MWF 8:00 am - 8:50 am, CB 118
002	D. Leep	MWF 12:00 pm - 12:50 pm, KAS 213
003	M. Shaw	TR 8:00 am - 9:15 am, CP 155
004	J. Schmidt	TR 12:30 am- 1:45 am, CP 155
005	M. Music	T 3:30 pm - 4:45 pm, CP 345
006	M. Music	R 3:30 pm - 4:45 pm, CP 208
007	W. Robinson	T 3:30 pm - 4:45 pm, CP 208
008	W. Robinson	R 3:30 pm - 4:45 pm, CB 204
009	M. Music	T 12:30 pm - 1:45 pm, NURS 214
010	W. Robinson	R 12:30 pm - 1:45 pm, NURS 504
011	S. Taylor	T 9:30 am - 10:45 am, BE 248
012	S. Taylor	R 9:30 am - 10:45 am, CB 214
013	B. Fox	T 9:30 am - 10:45 am, MMRB 243
014	B. Fox	T 9:30 am - 10:45 am, FB B3
015	C. Taylor	T 11:00 am - 12:15 pm, CB 347
016	B. Fox	T 11:00 am - 12:15 pm, CB 243
017	C. Taylor	T 2:00 pm - 3:15 pm, NURS 511
018	C. Taylor	R 2:00 pm - 3:15 pm, DH 323
019	G. Tiser	T 2:00 pm - 3:15 pm, CB 213
020	S. Taylor	R 2:00 pm - 3:15 pm, FB B8
021	G. Tiser	T 12:30 pm - 1:45 pm, FPAT 255
022	G. Tiser	R 12:30 pm - 1:45 pm, DH 323
401	S. Foege	TR 6:00 pm-7:15 pm, CB 347
402	S. Foege	TR 7:30 pm-8:45 pm, CB 347

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

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

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. Exactly one of the lines listed below is parallel to the line $y = (-5/2)x + 7$. Which one is it?

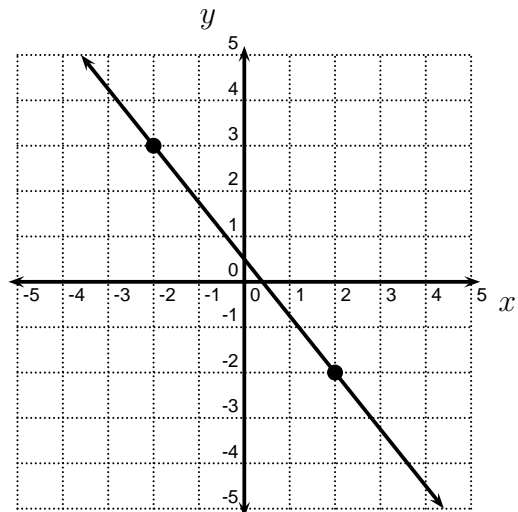
Possibilities:

- (a) $y = (2/5)x + 14$
 - (b) $y = (-5/2)x + 13$
 - (c) $y = (-2/5)x + 11$
 - (d) $y = (5/2)x + 8$
 - (e) $y = (-3/2)x + 7$
-

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

Possibilities:

- (a) $-5/4$
- (b) $4/5$
- (c) -5
- (d) $5/4$
- (e) $-4/5$



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3. Mike is 8 years older than Nancy. In 9 years, the sum of their ages will be 56. How old is Nancy now?

Possibilities:

- (a) 12
 - (b) 13
 - (c) 14
 - (d) 15
 - (e) 16
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4. Two trains start at the same train station. At noon, one train travels west at a velocity of 45 miles per hour and the other train travels east at a velocity of 55 miles per hour. How far apart are the trains after two hours?

Possibilities:

- (a) 200 miles
- (b) 20 miles
- (c) 2475 miles
- (d) 10 miles
- (e) 100 miles

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5. Which of the following is the correct expression for the derivative $g'(5)$?

Possibilities:

- (a) $\frac{g(5) - g(5 + h)}{h}$
- (b) $\frac{g(5 + h) - g(5)}{h}$
- (c) $\lim_{h \rightarrow 0} \frac{g(5) - g(5 + h)}{h}$
- (d) $\lim_{h \rightarrow 0} \frac{g(5 + h) - g(5)}{h}$
- (e) $\lim_{h \rightarrow 0} \frac{g(5 - h) - g(5)}{h}$

-
6. Suppose

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

Find A .

Possibilities:

- (a) -7
- (b) -6
- (c) -5
- (d) -4
- (e) -3

7. Compute

$$\lim_{t \rightarrow 4} \left(8 - t + \frac{t^2}{t - 1} \right)$$

Possibilities:

- (a) 9
- (b) $28/3$
- (c) $29/3$
- (d) 10
- (e) $31/3$

8. Compute $\lim_{t \rightarrow 4} \frac{t^2 - 3t - 4}{t^2 - t - 12}$

Possibilities:

- (a) $5/7$
- (b) $6/7$
- (c) 1
- (d) $8/7$
- (e) $9/7$

9. Compute $\lim_{t \rightarrow -2^-} \frac{|t + 2|}{t + 2}$

Possibilities:

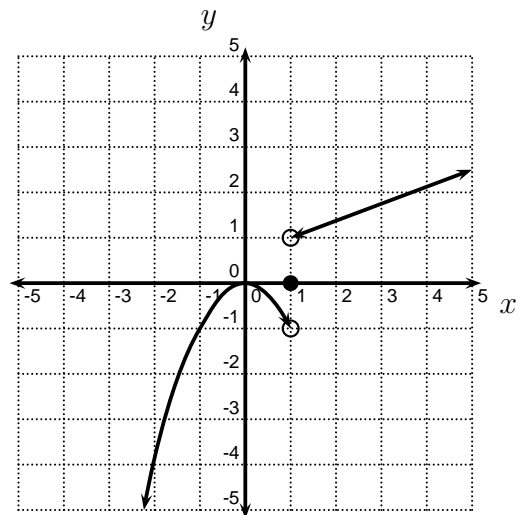
- (a) -2
 - (b) -1
 - (c) 0
 - (d) 1
 - (e) 2
-

10. Find the average rate of change of $f(x) = -3x - 1$ on the interval $[5, 8]$.

Possibilities:

- (a) 3
- (b) 0
- (c) -9
- (d) -3
- (e) 9

11. The graph of $y = f(x)$ is shown below. Compute $\lim_{x \rightarrow 1^-} f(x)$.



Possibilities:

- (a) -3
- (b) -1
- (c) 0
- (d) 1
- (e) 4

12. Find the average rate of change of $f(x) = 6x^2 - 1$ from $x = 5$ to $x = 5 + h$.

Possibilities:

- (a) $-60h - 6h^2$
- (b) $60 + 6h$
- (c) h
- (d) $60h + 6h^2$
- (e) $-60 - 6h$

13. Let $f(x) = 9x^2 - 6x - 7$. Find the instantaneous rate of change of $f(x)$ at $x = -5$.

Possibilities:

- (a) 0
- (b) $-96h + 9h^2$
- (c) $-96 + 9h$
- (d) -96
- (e) The instantaneous rate of change cannot be computed with the given information.

14. Let $f(x) = -5x^2 + 7x + 7$. Find a value c in the interval $[-4, 2]$ so that the average rate of change of $f(x)$ on $[-4, 2]$ is equal to the instantaneous rate of change of $f(x)$ at $x = c$.

Possibilities:

- (a) -1
- (b) 0
- (c) 1
- (d) 2
- (e) 3

15. Solve the inequality

$$x^2 - 12x + 32 < 0$$

Possibilities:

- (a) $x < 4$ or $x > 8$
- (b) $x > 16$
- (c) $-8 < x < -4$
- (d) $x < -8$ or $x > -4$
- (e) $4 < x < 8$

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

$$f(x) = \begin{cases} x^2, & \text{if } x \leq 4; \\ m(x - 4) + 16, & \text{if } x > 4 \end{cases}$$

Possibilities:

- (a) 7
- (b) 8
- (c) 9
- (d) 10
- (e) 11

17. A ball is thrown into the air. The height of the ball, measured in feet, t seconds later is given by $h(t) = -16t^2 + 64t$. Find the instantaneous velocity of the ball at time $t = 2$.

Possibilities:

- (a) -2 feet per second
- (b) -1 feet per second
- (c) 0 feet per second
- (d) 1 feet per second
- (e) 2 feet per second

18. Let $f(x) = 5x^2 - 3x - 5$. Find an equation for the line through the points $(1, f(1))$ and $(3, f(3))$.

Possibilities:

- (a) $y + 3 = 17(x - 1)$
- (b) $y - 1 = 17(x + 3)$
- (c) $y - 1 = 17x - 3$
- (d) $y - 3 = 17(x + 1)$
- (e) $y = 17x - 14$

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19. Let $f(x) = 8x^2 - 4x - 2$. Find an equation for the tangent line to the curve $y = f(x)$ at the point $x = 2$.

Possibilities:

- (a) $y - 22 = 28(x - 2)$
- (b) $y - 2 = 28x + 22$
- (c) $y - 2 = 28(x - 22)$
- (d) $y = 28x - 78$
- (e) $y + 22 = 28(x + 2)$

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

$$f(x) = \begin{cases} 6x^2, & \text{if } x \leq -3; \\ -3x + A, & \text{if } x > -3 \end{cases}$$

Possibilities:

- (a) 45
 - (b) -3
 - (c) 54
 - (d) -9
 - (e) No such value of A exists
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