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)

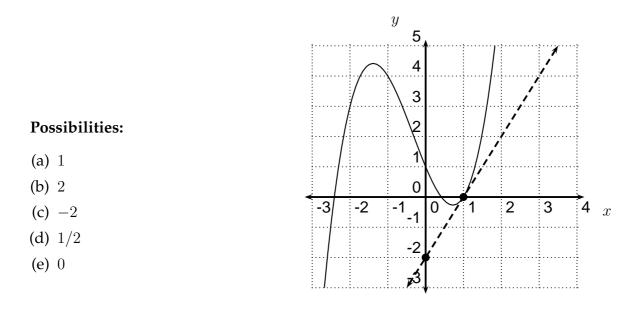| **Total**	
	(out of 100 points)

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. 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

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

Possibilities:

(a) 1

(b) 2

(c) -2

(d) $1/2$

(e) 0

2. $f(x) = (x-6)^2$. Find the value of C, given that

$$\frac{f(x+h) - f(x)}{h} = Ax + Bh + C$$

Possibilities:

(a) -12

(b) -11

(c) -10

(d) -9

(e) -8

3. Find the equation of the tangent line to the graph of $y = x^3 - 4x^2 - 2x + 4$ at $x = 3$.

Possibilities:

(a) $y = -x - 8$

(b) $y = -11$

(c) $y = x - 14$

(d) $y = 2x - 17$

(e) $y = 3x - 20$

4. Find the equation of the tangent line to the graph of $f(x) = \sqrt{x} + 5$ at $x = 4$.

Possibilities:

(a) $y = (1/4)\,x + 3$

(b) $y = (1/4)\,x + 4$

(c) $y = (1/4)\,x + 5$

(d) $y = (1/4)\,x + 6$

(e) $y = (1/4)\,x + 7$

5. Suppose that
$$\frac{f(x+h) - f(x)}{h} = \frac{-8hx - 4h^2}{h}$$
Find the derivative, $f'(2)$.

Possibilities:

(a) $-16 - 4h$

(b) -16

(c) 0

(d) -8

(e) The derivative does not exist.

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6. Find the derivative, $f'(x)$, of
$$f(x) = \frac{1}{x^7}$$

Possibilities:

(a) $-7x^{-6}$

(b) $1/(7\,x^8)$

(c) $1/(7\,x^6)$

(d) $7x^6$

(e) $-7x^{-8}$

7. Suppose $f(3) = 4$, $f'(3) = 9$, $g(3) = 2$, $g'(3) = 3$, $g(-3) = -5$, and $g'(-3) = 5$.
Find $F'(3)$, given that
$$F(x) = f(x)g(x)$$

Possibilities:

(a) 35

(b) 30

(c) 27

(d) 42

(e) There is not enough information to find the requested derivative.

8. Find the derivative, $f'(x)$, where
$$f(x) = \frac{x+5}{x+4}$$

Possibilities:

(a) $1/(x+4)$

(b) $-1/(x+4)$

(c) $-1/(x+4)^2$

(d) 1

(e) $1/(x+4)^2$

9. Find the derivative, $f'(x)$, where

$$f(x) = \ln\left(7x^2 + 5x + 7\right)$$

Possibilities:

(a) $\dfrac{1}{7x^2 + 5x + 7}$

(b) $14x + 5$

(c) $\dfrac{14x + 5}{7x^2 + 5x + 7}$

(d) $\dfrac{1}{14x + 5}$

(e) $\dfrac{7x^2 + 5x + 7}{14x + 5}$

10. Find the derivative, $f'(2)$, where

$$f(x) = \sqrt{21 + x^2}$$

Possibilities:

(a) $2/5$
(b) $\sqrt{5}/5$
(c) $4/5$
(d) $2\sqrt{5}/5$
(e) $1/5$

11. Find the derivative, $f'(x)$, where

$$f(x) = x^6 \ln(x)$$

Possibilities:

(a) x^6
(b) $6x^5 \ln(x) + x^6$
(c) $6x^5$
(d) $6x^5 \ln(x) + x^5$
(e) $6x^4$

12. Find the 11th derivative, $f^{(11)}(x)$, where

$$f(x) = e^{10x}$$

Possibilities:

(a) $10^{11}e^{10x}$

(b) $11^{10}e^{10x}$

(c) e^{10x}

(d) e^{110}

(e) 0

13. Find the derivative, $f'(34)$, where

$$f(x) = 5x + e^{-x}$$

Possibilities:

(a) $5 - e^{-34}$

(b) $5 - 34e^{-33}$

(c) $5 + 34e^{-34}$

(d) $5 + e^{-34}$

(e) $5 - 34e^{-35}$

14. Suppose $g(2) = 2$ and $g'(2) = -3$. Find $F'(2)$, given that

$$F(x) = (g(x))^4$$

Possibilities:

(a) -192

(b) -96

(c) 32

(d) -24

(e) 24

15. Find the second derivative, $f''(x)$, where

$$f(x) = e^{x^2}$$

Possibilities:

(a) $4x^2 e^{x^2}$

(b) $2xe^{x^2}$

(c) $4xe^{x^2}$

(d) $2e^{x^2} + 4x^2 e^{x^2}$

(e) $2xe^{x^2} + 4x^2 e^{x^2}$

16. How much money must be invested now in order to have \$3500 in 6 years, assuming interest is compounded continuously at an annual rate of 4.0% ?

Possibilities:

(a) $3500e^{24.0}$

(b) $3500e^{-24.0}$

(c) $3500e^{.240}$

(d) $3500(1 + 0.04)^{-6}$

(e) $3500e^{-.240}$

17. The population of a certain country triples every 37 years. If we express the population as $P(t) = P_0 e^{r \cdot t}$, then find r.

Possibilities:

(a) $37/\ln(3)$

(b) $37\ln(3)$

(c) $3/\ln(37)$

(d) $\ln(3)/37$

(e) $\ln(37)/3$

18. Find the maximum value of $f(x)$ on $[-5, 4]$ where $f(x) = |x - 1| + 16$.

    Possibilities:

    (a) 22
    (b) 19
    (c) 1
    (d) -5
    (e) 16

19. Find the value of x in the interval $[0, 6]$ where $f(x) = 2x^3 - 21x^2 + 60x + 8$ attains its maximum value.

    Possibilities:

    (a) 60
    (b) 2
    (c) 5
    (d) 0
    (e) 8

20. Let $f(t) = t^3$. Find a value c in the interval $(7, 10)$ so that the average rate of change of $f(t)$ on $[7, 10]$ is equal to the instantaneous rate of change of $f(t)$ at $t = c$.

    Possibilities:

    (a) $219/2$
    (b) 73
    (c) $\sqrt{(219/2)}$
    (d) 657
    (e) $\sqrt{73}$