

# MATH 151 Review 3 (Homework)

Past Due **Due Date: THU, APR 16, 2026 11:30 PM CDT**

**Current Score:** 43 / 43 POINTS | 100.0 %

Due date has passed. No changes can be made without an approved extension request. **You may not be granted an extension if you have already viewed the answer key.**

VIEW ANSWER KEY

## Scoring and Assignment Information

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
POINTS	1/1	1/1	1/1	4/4	2/2	1/1	3/3	1/1	1/1	1/1	1/1	3/3	2/2	1/1	1/1	1/1	1/1	4/4	1/1	6/6	1/1	1/1	2/2	1/1	1/1

### Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

### Assignment Scoring

Your best submission for each question part is used for your score.

1. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.9.024.

Find the most general antiderivative of the function. (Check your answer by differentiation. Remember the constant of the antiderivative.)

$$g(v) = 2 \cos(v) - \frac{9}{\sqrt{1-v^2}}$$

$G(v) =$   
 $2\sin(v) - 9\arcsin(v) + C$

Amazing job!

### Resources

[Read It](#)

2. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>Calc</sub>ET9 4.4.045.

Find the limit. Use l'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow 0} \sin(5x) \csc(3x)$$

\$\$\$3

✔ Fantastic work!

#### Resources

[Read It Watch it](#)

3. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>Calc</sub>ET9 4.4.065.

Find the limit. Use l'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow 0^+} (9x + 1)^{\cot(x)}$$

\$\$e9

✔ Good work!

#### Resources

[Read It Watch it](#)

4. [4 / 4 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S CalcET9 4.4.080.

If an object with mass  $m$  is dropped from rest, one model for its speed  $v$  after  $t$  seconds, taking air resistance into account, is

$$v = \frac{mg}{c}(1 - e^{-ct/m}),$$

where  $g$  is the acceleration due to gravity and  $c$  is a positive constant. (Note that the air resistance is proportional to the velocity of the object;  $c$  is the proportionality constant.)

(a) Calculate  $\lim_{t \rightarrow \infty} v$ .

\$\$\$mgc

✔ Excellent job!

What is the meaning of this limit in the context of this problem?

- It is the speed the object reaches before it starts to slow down.
- It is the speed the object approaches as time goes on.
- It is the time it takes the object to reach its maximum speed.
- It is the time it takes for the object to stop.

Awesome!

(b) For fixed  $t$ , use l'Hospital's Rule to calculate  $\lim_{c \rightarrow 0^+} v$ .

\$\$\$gt

✔ Way to go!

What can you conclude about the velocity of a falling object in a vacuum?

- An object falling in a vacuum will accelerate at a slower rate than an object not in a vacuum.
- The heavier the object is the faster it will fall in a vacuum.
- The velocity of a falling object in a vacuum is directly proportional to the amount of time it falls.
- The velocity of a falling object is proportional to its mass in a vacuum.

Nice work!

## Resources

[Read It](#)

5. [2 / 2 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>CalcET9</sub> 4.3.084.

For what values of the numbers  $a$  and  $b$  does the function

$$f(x) = axe^{bx^2}$$

have the maximum value  $f(4) = 1$ ?

$a = \sqrt{e}4$

✔ Great work!

$b = -132$

✔ Great job!

### Resources

[Read It](#)

6. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>CalcET9</sub> 4.4.011.

Find the limit. Use l'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow 1} \frac{x^5 - 1}{x^3 - 1}$$

53

✔ Awesome!

### Resources

[Read It](#)

7. [3 / 3 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S CalcET9 4.2.020.

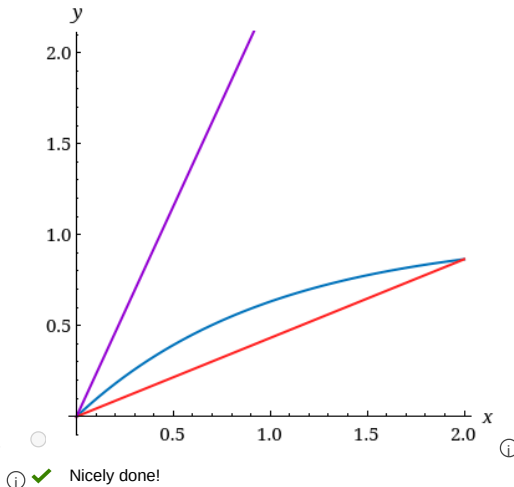
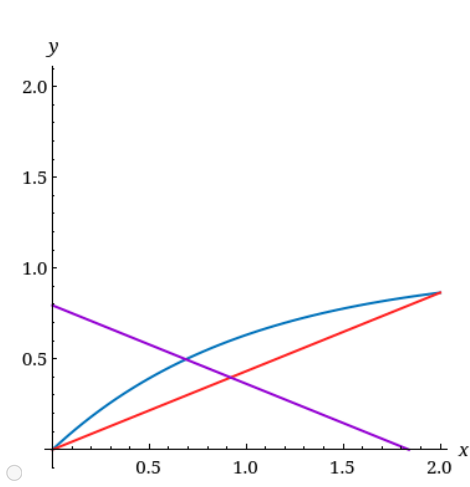
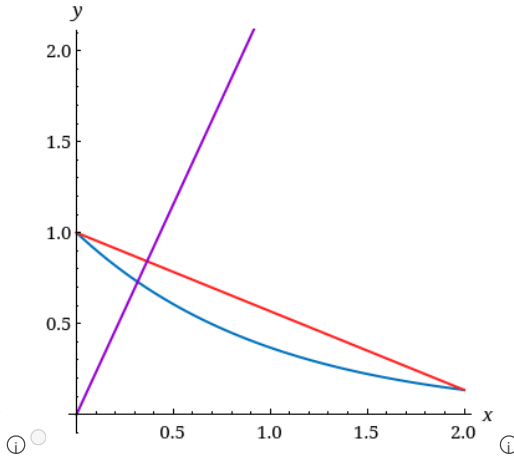
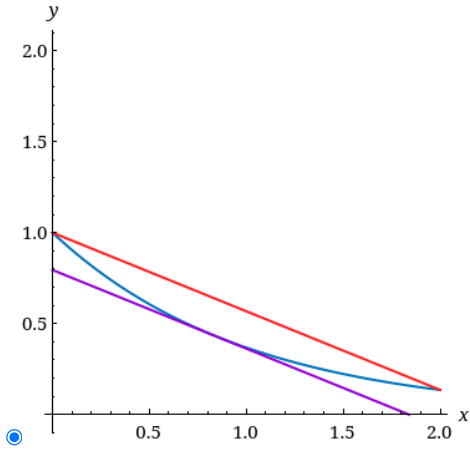
Find the number  $c$  that satisfies the conclusion of the Mean Value Theorem on the given interval. (If an answer does not exist, enter DNE.)

$$f(x) = e^{-x}, \quad [0, 2]$$

$c =$   
\$\$\$-ln(1-e^{-2})\$

✓ Good work.

Graph the function, the secant line through the endpoints, and the tangent line at  $(c, f(c))$ .



✓ Nicely done!

Are the secant line and the tangent line parallel?

Yes  
 No

Amazing work!

### Resources

[Read It](#)

8. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>Calc</sub>ET9 4.4.060.

Find the limit. Use L'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x}\right)^{bx}$$

Seab

Great job!

Resources

[Read It](#)

9. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>Calc</sub>ET9 4.4.053.

Find the limit. Use L'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow 0^+} \left(\frac{1}{x} - \frac{1}{e^x - 1}\right)$$

12

Great job!

Resources

[Read It](#)

10. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>Calc</sub>ET9 4.4.047.

Find the limit. Use L'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow \infty} x^5 e^{-x^4}$$

0

That's great!

Resources

[Read It](#) [Watch It](#)

11. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.9.027.

Find the antiderivative  $F$  of  $f$  that satisfies the given condition. Check your answer by comparing the graphs of  $f$  and  $F$ .

$$f(x) = 2e^x - 8x, \quad F(0) = 5$$

$$F(x) = 2e^x - 4x^2 + 3$$

✓ Nicely done.

#### Resources

[Read It](#)

12. [3 / 3 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.7.005.EP.

Find a function that gives the vertical distance  $v$  between the line  $y = x + 6$  and the parabola  $y = x^2$  for  $-2 \leq x \leq 3$ .

$$v(x) = x + 6 - x^2$$

✓ Nicely done.

Find  $v'(x)$ .

$$v'(x) = 1 - 2x$$

✓ Perfect!

What is the maximum vertical distance between the line  $y = x + 6$  and the parabola  $y = x^2$  for  $-2 \leq x \leq 3$ ?

✓ Nice job.

#### Resources

[Read It](#) [Watch It](#)

13. [2 / 2 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.7.009.MI.SA.

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

**Tutorial Exercise**

A model used for the yield  $Y$  of an agricultural crop as a function of the nitrogen level  $N$  in the soil (measured in appropriate units) is

$$Y = \frac{kN}{16 + N^2},$$

where  $k$  is a positive constant. What nitrogen level gives the largest yield?

**Step 1**

We are given that  $N$  represents the nitrogen level in the soil, and we note that this must be a non-negative value, so we need to maximize the given function

$$Y = \frac{kN}{16 + N^2},$$

for  $N \geq 0$ . So we recall the first derivative test for absolute extrema values which states that if  $c$  is a critical number of a continuous function  $Y$  defined on an interval, then the following holds.

- If  $Y'(N) > 0$  for all  $N < c$  and  $Y'(N) < 0$  for all  $N > c$ , then  $Y(c)$  is the absolute maximum value of  $Y$ .
- If  $Y'(N) < 0$  for all  $N < c$  and  $Y'(N) > 0$  for all  $N > c$ , then  $Y(c)$  is the absolute minimum value of  $Y$ .

To apply this test we must first find  $Y'(N)$ . Doing so gives the following result.

$$Y(N) = \frac{kN}{16 + N^2}$$

$$Y'(N) = \frac{k(16 - N^2)(16 + N^2)^{-2}}$$



Setting this derivative equal to 0 and solving for  $N$  in the interval  $N \geq 0$  gives the following result.

$$N = 4$$



Applying the test, we see that there is an absolute **maximum** at this value of  $N$ .

**Step 2**

We have determined that for the given yield function there is an absolute maximum when  $N = 4$ . This allows us to state the nitrogen level that gives the highest yield.

$$N = 4$$



You have now completed the Master It.

**Resources**
[Read It](#)

14. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.9.028.

Find the antiderivative  $F$  of  $f$  that satisfies the given condition. Check your answer by comparing the graphs of  $f$  and  $F$ .

$$f(x) = 5 - 3(1 + x^2)^{-1}, \quad F(1) = 0$$

 $F(x) =$ 

$$5x - 3\arctan(x) + 3\pi/4 - 5$$

You're right!

**Resources**
[Read It](#)

15. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER


SCalcET9 4.9.021.

Find the most general antiderivative of the function. (Check your answer by differentiation. Remember the constant of the antiderivative.)

$$f(\theta) = 7 \sin(\theta) - 9 \sec(\theta) \tan(\theta) \quad \text{on the interval } \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$$

$$F(\theta) =$$

$$-7\cos(\theta) - 9\sec(\theta) + C$$

 Good work!

## Resources

[Read It](#)

16. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.9.010.

Find the most general antiderivative of the function. (Check your answer by differentiation. Remember the constant of the antiderivative.)

$$f(x) = (x - 9)^2$$

$$F(x) =$$

$$(x-9)33 + C$$

 Fantastic job!

## Resources

[Read It](#)

17. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.4.059.MI.

Find the limit. Use l'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow 0} (1 - 6x)^{1/x}$$

$$e^{-6}$$

 Nice job!

## Resources

[Read It](#) [Watch It](#) [Tutorial](#)

18. [4 / 4 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.3.021.

Consider the following. (If an answer does not exist, enter DNE.)

$$f(x) = \ln(x^2 + 3)$$

Find the interval(s) on which  $f$  is concave up. (Enter your answer using interval notation.)

\$\$\$(-\sqrt{3}, \sqrt{3})\$

✔ Well done.

Find the interval(s) on which  $f$  is concave down. (Enter your answer using interval notation.)

\$\$\$(-\infty, -\sqrt{3}) \cup (\sqrt{3}, \infty)\$

✔ Awesome job!

Find the inflection points of  $f$ .smaller  $x$ -value $(x, y) =$ 

\$\$\$-\sqrt{3}, \ln(6)\$

✔ )

larger  $x$ -value $(x, y) =$ 

\$\$\$ \sqrt{3}, \ln(6)\$

✔ )

## Resources

[Read It](#)

19. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.9.015.

Find the most general antiderivative of the function. (Check your answer by differentiation. Remember the constant of the antiderivative.)

$$f(t) = \frac{2t - 4 + 4\sqrt{t}}{\sqrt{t}}$$

 $F(t) =$ 

\$\$\$43t(32)-8\sqrt{t}+4t + C\$

✔ Very nice!

## Resources

[Read It](#)

20. [6 / 6 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>Calc</sub>ET9 4.3.009.EP.

Consider the following function.

$$f(x) = 2x^3 - 12x^2 + 18x - 6$$

Find the derivative.

$$f'(x) =$$

$$6x^2 - 24x + 18$$

✔ Very nice!

Find any critical numbers of the function. (Enter your answer as a comma-separated list. If any answer does not exist, enter DNE)

$$x =$$

$$1, 3$$

✔ Amazing job.

Find the interval(s) on which  $f$  is increasing. (Enter your answer using interval notation.)

$$(-\infty, 1) \cup (3, \infty)$$

✔ Fantastic job!

Find the interval(s) on which  $f$  is decreasing. (Enter your answer using interval notation.)

$$(1, 3)$$

✔ Impressive work.

Find the local minimum and maximum value of  $f$ .

local minimum value

$$-6$$

✔ That's it!

local maximum value

$$2$$

✔ That's great!

### Resources

[Read It](#)

21. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S<sub>Calc</sub>ET9 4.9.037.

Find  $f$ .

$$f'(x) = 16x^3 + \frac{1}{x}, \quad x > 0, \quad f(1) = 2$$

$$f(x) =$$

$$4x^4 + \ln(x) - 2$$

✔ Exactly!

### Resources

[Read It](#)

22. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.1.047.

Find the critical numbers of the function. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$$g(x) = x^2 \ln(x)$$

$x =$   
 $\frac{1}{e}$

✓ Awesome job!

## Resources

[Read It](#)

23. [2 / 2 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.1.065.

Find the absolute maximum and absolute minimum values of  $f$  on the given interval.

$$f(x) = \ln(x^2 + 7x + 14), \quad [-4, 1]$$

absolute minimum value  $\frac{1}{74}$

✓ Good work.

absolute maximum value  $\frac{1}{22}$

✓ Well done.

## Resources

[Read It](#)

24. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.4.067.

Find the limit. Use l'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \rightarrow 0^+} (1 + \sin(2x))^{1/x}$$

$e^2$

✓ Amazing work.

## Resources

[Read It](#)

25. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 4.9.018.

Find the most general antiderivative of the function. (Check your answer by differentiation. Remember the constant of the antiderivative.)

$$f(x) = \frac{2x^2 - 7x + 9}{x^2}, \quad x > 0$$

$F(x) =$   
\$\$-7\ln(x)+2x-9x-1+C

✔ Exactly!

### Resources

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