4.2 Hmwk - The Mean Value Theorem (Homework)

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Past Due **Due Date:** SAT, APR 18, 2026 11:59 PM CDT

Current Score: 20 / 20 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
POINTS	6 / 6	2 / 2	1 / 1	1 / 1	3 / 3	7 / 7

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. **[6 / 6 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

SCalcET9 4.2.010.EP.

Consider the following function and closed interval.

$f(x) = x^3 - 4x^2 - 16x + 4, \quad [-4, 4]$

Is f continuous on the closed interval [−4, 4]?

- (•) Yes
- ( ) No

Good work!

If f is differentiable on the open interval (−4, 4), find $f'(x)$. (If it is not differentiable on the open interval, enter DNE.)

$f'(x) =$

$$3x2−8x−16

Well done!

Find $f(-4)$ and $f(4)$. (If an answer does not exist, enter DNE.)

$f(-4)$ = $$−60

Outstanding!

$f(4)$ = $$−60

You got it!

Determine whether Rolle's theorem can be applied to f on the closed interval [−4, 4]. (Select all that apply.)

- [x] Yes, Rolle's Theorem can be applied.
- [ ] No, because f is not continuous on the closed interval [−4, 4].
- [ ] No, because f is not differentiable on the open interval (−4, 4).
- [ ] No, because $f(-4) \neq f(4)$.

Good job.

If Rolle's theorem can be applied, find all values of c in the open interval (−4, 4) such that $f'(c) = 0$. (Enter your answers as a comma-separated list. If Rolle's theorem cannot be applied, enter NA.)

$c =$

$$−43

That's it!

Resources

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2. **[2 / 2 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

SCalcET9 4.2.013.

Consider the following function.

$f(x) = 4 - x^{2/3}$

Find $f(-8)$ and $f(8)$.

$f(-8)$ = $$0

You got it!

$f(8)$ = $$0

Awesome!

Find all values c in $(-8, 8)$ such that $f'(c) = 0$. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

c =
$$*DNE*

Excellent job!

Based off of this information, what conclusions can be made about Rolle's Theorem?

- This contradicts Rolle's Theorem, since f is differentiable, $f(-8) = f(8)$, and $f'(c) = 0$ exists, but c is not in $(-8, 8)$.
- This does not contradict Rolle's Theorem, since $f'(0) = 0$, and 0 is in the interval $(-8, 8)$.
- This contradicts Rolle's Theorem, since $f(-8) = f(8)$, there should exist a number c in $(-8, 8)$ such that $f'(c) = 0$.
- (selected) This does not contradict Rolle's Theorem, since $f'(0)$ does not exist, and so f is not differentiable on $(-8, 8)$.
- Nothing can be concluded.

Good job.

Resources

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3. **[1 / 1 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

SCalcET9 4.2.021.

Let $f(x) = (x - 3)^{-2}$. Find all values of c in (2, 5) such that $f(5) - f(2) = f'(c)(5 - 2)$. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$c =$
$$DNE

✔ Great job!

Based off of this information, what conclusions can be made about the Mean Value Theorem?

- ○ This contradicts the Mean Value Theorem since f satisfies the hypotheses on the given interval but there does not exist any c on (2, 5) such that $f'(c) = \frac{f(5) - f(2)}{5 - 2}$.
- ● This does not contradict the Mean Value Theorem since f is not continuous at $x = 3$.
- ○ This does not contradict the Mean Value Theorem since f is continuous on (2, 5), and there exists a c on (2, 5) such that $f'(c) = \frac{f(5) - f(2)}{5 - 2}$.
- ○ This contradicts the Mean Value Theorem since there exists a c on (2, 5) such that $f'(c) = \frac{f(5) - f(2)}{5 - 2}$, but f is not continuous at $x = 3$.
- ○ Nothing can be concluded.

✔

Great work!

Resources

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4. **[1 / 1 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

SCalcET9 4.2.030.MI.

Suppose that $4 \le f'(x) \le 5$ for all values of x. What are the minimum and maximum possible values of $f(8) - f(3)$?

20 ✔ $\le f(8) - f(3) \le$ 25 ✔

Resources

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5. **[3 / 3 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

SCalcET9 4.2.020.

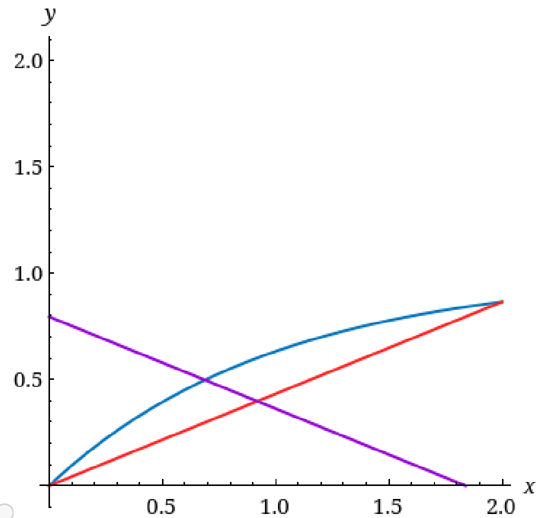
Find the number *c* that satisfies the conclusion of the Mean Value Theorem on the given interval. (If an answer does not exist, enter DNE.)

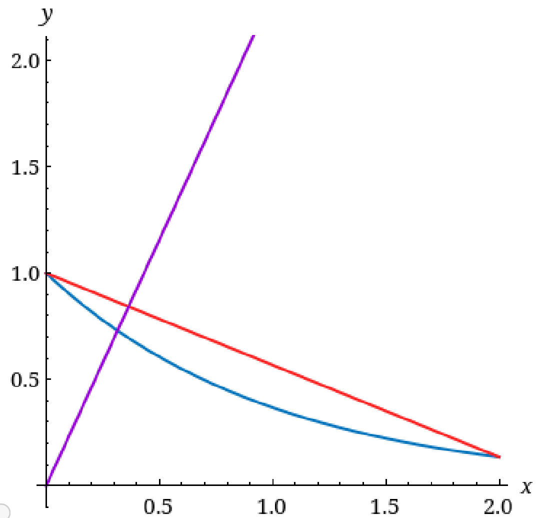
$f(x) = e^{-x}$, [0, 2]

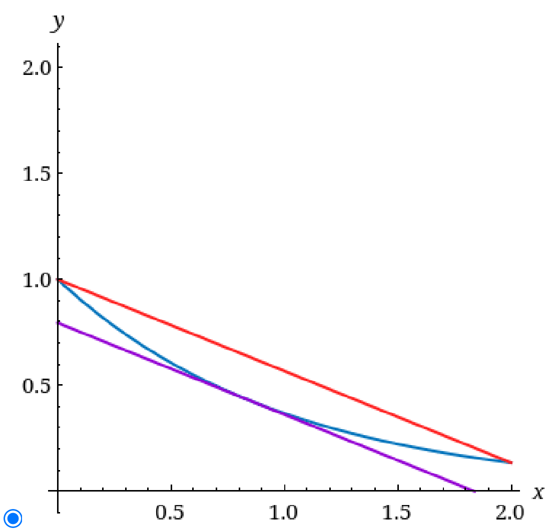
c =
$$ln(21−e−2)

✔ Good work.

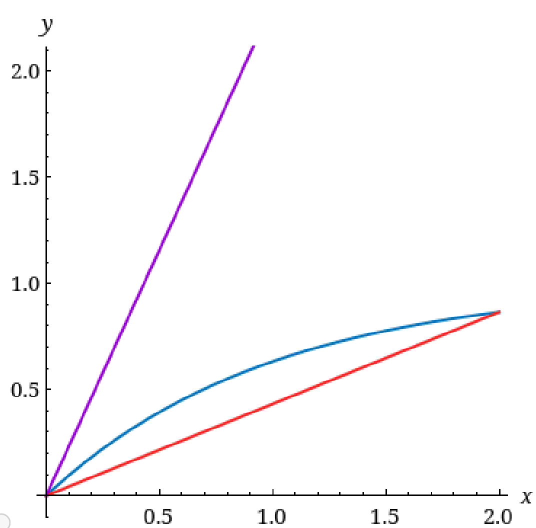
Graph the function, the secant line through the endpoints, and the tangent line at (*c*, *f*(*c*)).







✔ You got it!



Are the secant line and the tangent line parallel?

- (•) Yes
- ( ) No

✔

You got it!

Resources

Read It

6. **[7 / 7 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

SCalcET9 4.2.016.EP.

Consider the following function and closed interval.

$f(x) = x^3 - 3x + 3, \quad [-2, 2]$

Is *f* continuous on the closed interval [−2, 2]?

- ○ Yes, it does not matter if *f* is continuous or differentiable; every function satisfies the mean value theorem.
- ● Yes, *f* is continuous on [−2, 2] and differentiable on (−2, 2) since polynomials are continuous and differentiable on $\mathbb{R}$.
- ○ No, *f* is not continuous on [−2, 2].
- ○ No, *f* is continuous on [−2, 2] but not differentiable on (−2, 2).
- ○ There is not enough information to verify if this function satisfies the mean value theorem.

✓

That's it!

If *f* is differentiable on the open interval (−2, 2), find $f'(x)$. (If it is not differentiable on the open interval, enter DNE.)

$f'(x) =$

$$3x2−3

✓ Excellent!

Find *f*(−2) and *f*(2). (If an answer does not exist, enter DNE.)

$f(-2)$ = $$1

✓ Nice job.

$f(2)$ = $$5

✓ Outstanding!

Find $\frac{f(b) - f(a)}{b - a}$ for $[a, b] = [-2, 2]$. (If an answer does not exist, enter DNE.)

$\frac{f(b) - f(a)}{b - a} =$

$$1

✓ That's it!

Determine whether the mean value theorem can be applied to *f* on the closed interval [−2, 2]. (Select all that apply.)

- ☑ Yes, the Mean Value Theorem can be applied.
- ☐ No, because *f* is not continuous on the closed interval [−2, 2].
- ☐ No, because *f* is not differentiable on the open interval (−2, 2).
- ☐ No, because $\frac{f(b) - f(a)}{b - a}$ is not defined.

✓

Nicely done.

If the mean value theorem can be applied, find all values of *c* that satisfy the conclusion of the mean value theorem. (Enter your answers as a comma-separated list. If it does not satisfy the hypotheses, enter DNE).

c =

$$2√33,−2√33

✓ Nicely done!

Resources

Read It

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