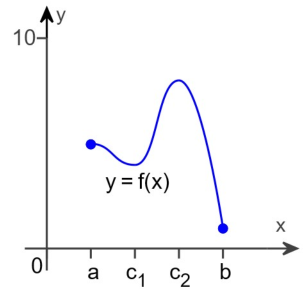
Student: Cole Lamers **Date:** 09/17/19	**Instructor:** Viktoriya Shcherban **Course:** Calc 1 11:30 AM / Internet (81749&81750) Shcherban	**Assignment:** 4.1 Extreme Values of Functions (Set 1)

1. Determine from the given graph whether the function has any absolute extreme values on [a, b]. Then explain how your answer is consistent with the extreme value theorem.



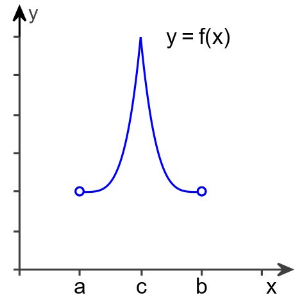
Determine whether the function has any absolute extreme values on [a, b]. Choose the correct answer below.

- **A.** The function has an absolute minimum value x = b but does not have an absolute maximum value on [a, b].
- **B.** The function has an absolute maximum value at $x = c_1$ but does not have an absolute minimum value on [a, b].
- **C.** The function does not have any absolute extreme values on [a, b].
- ✔ **D.** The function has an absolute maximum value at $x = c_2$ and an absolute minimum value at x = b on [a, b].

Explain the results in terms of the extreme value theorem.

- ✔ **A.** Since the function f is continuous on a closed interval, f attains both an absolute maximum value and an absolute minimum value on its domain.
- **B.** Since the function f is not continuous and the domain of f is a closed interval, f may or may not have any absolute extreme values on its domain.
- **C.** Since the function f is continuous and the domain of f is not a closed interval, f may or may not have any absolute extreme values on its domain.
- **D.** Since the function f is not continuous and the domain of f is not a closed interval, f may or may not attain any absolute extreme values on its domain.

2. Determine from the given graph whether the function has any absolute extreme values on (a, b). Then explain how your answer is consistent with the extreme value theorem.



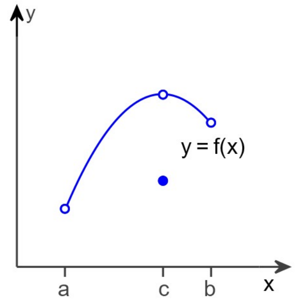
Determine whether the function has any absolute extreme values on (a, b). Choose the correct answer below.

- **A.** The function has an absolute maximum value at x = c but does not have an absolute minimum value on (a, b).
- **B.** The function has an absolute maximum value at x = c and an absolute minimum value at x = b on (a, b).
- **C.** The function has an absolute minimum value at x = b but does not have an absolute maximum value on (a, b).
- **D.** The function does not have any absolute extreme values on (a, b).

Explain the results in terms of the extreme value theorem.

- **A.** Since the function f is not continuous and the domain of f is a closed interval, f may or may not have any absolute extreme values on its domain.
- **B.** Since the function f is not continuous and the domain of f is not a closed interval, f may or may not attain any absolute extreme values on its domain.
- **C.** Since the function f is continuous on a closed interval, f attains both an absolute maximum value and an absolute minimum value on its domain.
- **D.** Since the function f is continuous and the domain of f is not a closed interval, f may or may not have any absolute extreme values on its domain.

3. Determine from the given graph whether the function has any absolute extreme values on (a, b). Then explain how your answer is consistent with the extreme value theorem.



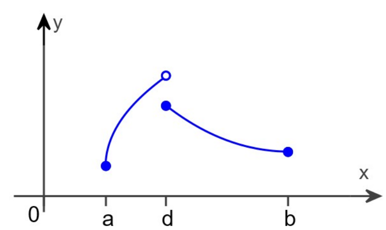
Determine whether the function has any absolute extreme values on (a, b). Choose the correct answer below.

- **A.** The function has an absolute maximum value at x = a but does not have an absolute minimum value on (a, b).
- **B.** The function has an absolute minimum at x = c value but does not have an absolute maximum value on (a, b).
- **C.** The function has an absolute maximum value at x = a and an absolute minimum value at x = c on (a, b).
- **D.** The function does not have any absolute extreme values on its domain.

Explain the results in terms of the extreme value theorem.

- **A.** Since the function f is continuous on a closed interval, f attains both an absolute maximum value and an absolute minimum value on its domain.

4. Determine from the graph whether the function has any absolute extreme values on [a, b]. Then explain how your answer is consistent with the extreme value theorem.



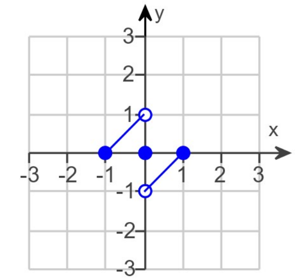
Where do the absolute extreme values of the function occur on [a, b]?

- **A.** The absolute maximum occurs at x = d and the absolute minimum occurs at x = a on [a, b].
- **B.** The absolute maximum occurs at x = d and there is no absolute minimum on [a, b].
- **C.** There is no absolute maximum and there is no absolute minimum on [a, b].
- **D.** There is no absolute maximum and the absolute minimum occurs at x = a on [a, b].

Explain the results in terms of the extreme value theorem.

- **A.** The function does not satisfy the criteria, so absolute extrema may or may not exist.
- **B.** The function satisfies the criteria, so absolute extrema may or may not exist.
- **C.** The function satisfies the criteria, so absolute extrema must exist.
- **D.** The function does not satisfy the criteria, so absolute extrema must not exist.

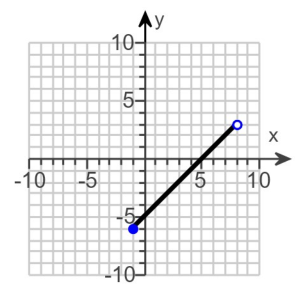
5. Find the absolute extreme values and where they occur.



Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

- **A.** The absolute maximum occurs at ________.
- **B.** The absolute minimum occurs at ________.
- **C.** The absolute maximum occurs at ________ and the absolute minimum occurs at ________.
- **D.** There is no absolute maximum and there is no absolute minimum.

6. Find the absolute extreme values and where they occur.



Choose the correct answer below and, if necessary, fill in the answer box within your choice.

- **A.** The absolute minimum is at $(-1,-6)$.
  (Type an ordered pair.)
- **B.** The absolute maximum is at ________.
  (Type an ordered pair.)
- **C.** The absolute minimum is at ________, and the absolute maximum is at ________.
  (Type ordered pairs.)
- **D.** There is no absolute minimum or absolute maximum.

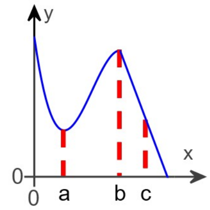
7.

Find the graph given the following table.

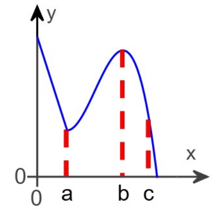
x	**f′(x)**
a	does not exist
b	0
c	2

Choose the correct graph below.

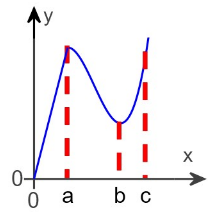
A.



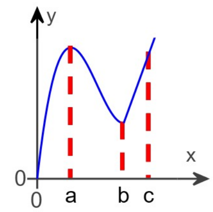
B.



C.



D.



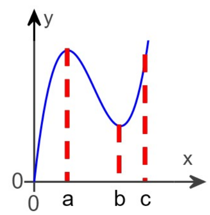
8.

Find the graph given the following table.

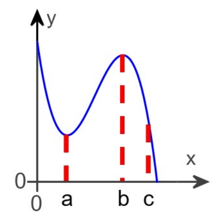
x	**f′(x)**
a	0
b	0
c	− 1

Choose the correct graph below.

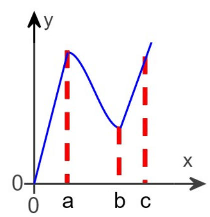
A.



B.



C.



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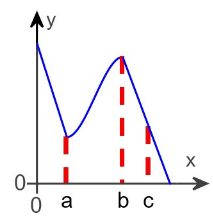
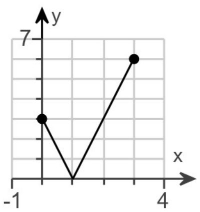


9. Sketch the graph of the following function and determine whether the function has any absolute extreme values on its domain. Explain how your answer is consistent with the extreme value theorem.

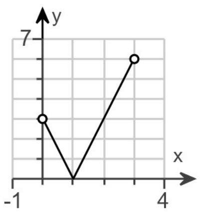
$f(x) = 3|x - 1|, \quad 0 < x < 3$

Sketch the graph of the function f(x). Choose the correct graph below.

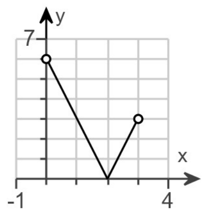
A.



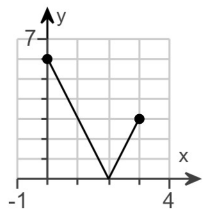
B.



C.



D.



Determine whether the function has any absolute extreme values on its domain. Choose the correct answer below.

- **A.** The function has an absolute maximum value at x = 3 and an absolute minimum value at x = 1 on its domain.
- **B.** The function has an absolute minimum value at x = 1 but does not have an absolute maximum value on its domain.
- **C.** The function has an absolute maximum value at x = 3 but does not have an absolute minimum value on its domain.
- **D.** The function does not have any absolute extreme values on its domain.

Explain the results in terms of the extreme value theorem.

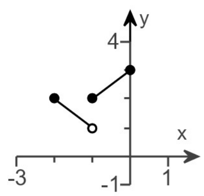
- **A.** Since the function f is continuous on an open interval, f may or may not have any absolute extreme values on its domain.
- **B.** Since the function f is continuous on a closed interval, f attains both an absolute maximum value and an absolute minimum value on its domain.
- **C.** Since the function f is not continuous on an open interval, f does not attain any absolute extreme values on its domain.
- **D.** Since the function f is not continuous on a closed interval, f may or may not have any absolute extreme values on its domain.

10. Sketch the graph of the following function and determine whether the function has any absolute extreme values on its domain. Explain how your answer is consistent with the extreme value theorem.

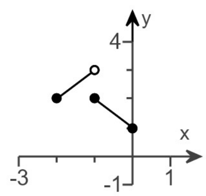
$$g(x) = \begin{cases} -x, & -2 \le x < -1 \\ x + 3, & -1 \le x \le 0 \end{cases}$$

Sketch the graph of the function g(x). Choose the correct graph below.

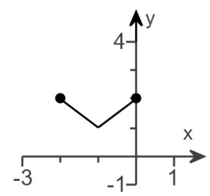
A.



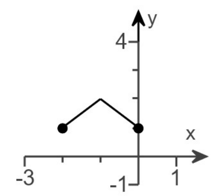
B.



C.



D.



Determine whether the function has any absolute extreme values on its domain. Choose the correct answer below.

A. The function has an absolute maximum at x = 0 value but does not have an absolute minimum value on its domain.

B. The function has an absolute minimum value at x = − 1 and an absolute maximum at x = 0 on its domain.

C. The function has an absolute minimum value at x = − 1 but does not have an absolute maximum value on its domain.

D. The function does not have any absolute extreme values on its domain.

Explain the results in terms of the extreme value theorem.

A. Since the function g is not continuous on a closed interval, it may or may not have any absolute extreme values on its domain.

B. Since the function g is continuous on an open interval, it may or may not have any absolute extreme values on its domain.

C. Since the function g is not continuous on an open interval, it does not attain any absolute extreme values on its domain.

D. Since the function g is continuous on a closed interval, it attains both an absolute maximum value and an absolute minimum value on its domain.

11. Find the absolute maximum and minimum values of the function on the given interval.

$$f(x) = \frac{7}{9}x + 1, \qquad -8 \le x \le 8$$

The absolute maximum of the function $f(x) = \frac{7}{9}x + 1$ on the interval $-8 \le x \le 8$ has a value of $\frac{65}{9}$.

(Type a simplified fraction.)

The absolute minimum of the function $f(x) = \frac{7}{9}x + 1$ on the interval $-8 \le x \le 8$ has a value of $-\frac{47}{9}$.

(Type a simplified fraction.)

12. Find the absolute maximum and minimum values of the function on the given interval.

$f(x) = -x^2 + 1, \qquad -1 \le x \le 2$

The absolute maximum of the function $f(x) = -x^2 + 1$ on the interval $-1 \le x \le 2$ has a value of 1.
(Simplify your answer.)

The absolute minimum of the function $f(x) = -x^2 + 1$ on the interval $-1 \le x \le 2$ has a value of −3.
(Simplify your answer.)

13. Use the given function and the given interval to complete parts **a** and **b**.

$f(x) = 2x^3 - 33x^2 + 144x$ on [2,9]

a. Determine the absolute extreme values of f on the given interval when they exist.
b. Use a graphing utility to confirm your conclusions.

a. What is/are the absolute maximum/maxima of f on the given interval? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The absolute maximum/maxima is/are 189 at x = 3.
(Use a comma to separate answers as needed. Type exact answers, using radicals as needed.)

B. There is no absolute maximum of f on the given interval.

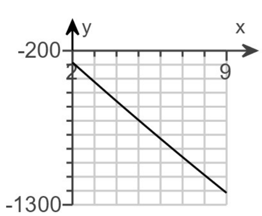
What is/are the absolute minimum/minima of f on the given interval? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The absolute minimum/minima is/are 64 at x = 8.
(Use a comma to separate answers as needed. Type exact answers, using radicals as needed.)

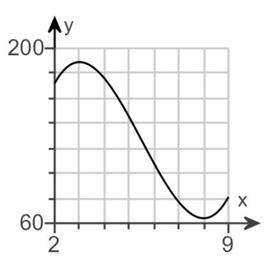
B. There is no absolute minimum of f on the given interval.

b. Choose the correct answer below.

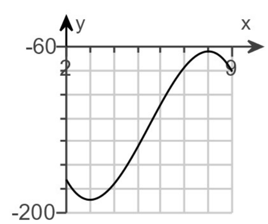
A.



B.



C.



D.