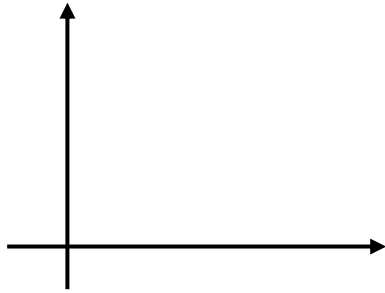


Write your questions
and thoughts here!**Intermediate Value Theorem (for continuous functions) - IVT**

Justification with the IVT.

- i. The function $f(x)$ is continuous on an interval [].
- ii. $f() \neq f()$
- iii. ___ is between $f()$ and $f()$.

Conclusion: \therefore IVT applies and there exists a value c between ___ and ___ such that $f(c) = \underline{\hspace{2cm}}$.

Determine if the Intermediate Value Theorem holds for the given value of k .

1. $f(x) = x^2 - x + 1$, $[a, b] = [-1, 5]$,
 $k = 8$

2. $h(x) = \frac{1}{x-1}$, $[a, b] = [3, 5]$, $k = \frac{1}{3}$

Below is a table of values for a continuous function f .

x	0	3	4	8	9
$f(x)$	1	-5	3	7	-1

3. On the interval $4 \leq x \leq 9$, what is the fewest possible times $f(x) = 1$?
4. On the interval $0 \leq x \leq 4$, **must** there be a value of x for which $f(x) = 2$? Explain.

1.16 Intermediate Value Theorem (IVT)

Calculus

Practice

Below is a table of values for a continuous function f .

x	-5	1	3	8	14
$f(x)$	7	40	21	75	-100

1. On the interval $-5 \leq x \leq 1$, must there be a value of x for which $f(x) = 30$? Explain.

2. On the interval $-5 \leq x \leq 14$ what is the minimum number of zeros?

3. For $1 \leq x \leq 14$, what is the fewest possible times $f(x) = 20$?

4. For $1 \leq x \leq 8$, what is the fewest possible times $f(x) = 7$?

Below is a table of values for a continuous function h .

x	-7	-2	1	4	11
$h(x)$	2	-5	6	-1	10

5. On the interval $4 \leq x \leq 11$, must there be a value of x for which $h(x) = -2$? Explain.

6. On the interval $-7 \leq x \leq 11$ what is the minimum number of zeros?

7. For $-2 \leq x \leq 4$, what is the fewest possible times $h(x) = 2$?

8. For $-7 \leq x \leq 1$, what is the fewest possible times $h(x) = 3$?

Below is a table of values for a continuous function g .

x	0	2	15	32	50
$g(x)$	-1	10	17	-10	8

9. On the interval $15 \leq x \leq 32$, must there be a value of x for which $g(x) = 11$? Explain.

10. On the interval $15 \leq x \leq 50$ what is the minimum number of zeros?

11. On the interval $0 \leq x \leq 50$ what is the minimum number of zeros?

12. For $15 \leq x \leq 50$, what is the fewest possible times $g(x) = 1$?

Determine if the Intermediate Value Theorem holds for the given value of k .

13. $f(x) = 3 - x^2$, $[a, b] = [-2, 1]$, $k = 0$

14. $g(x) = \frac{1}{x}$, $[a, b] = [2, 5]$, $k = -1$

15. **Calculator active.**

$h(x) = \ln(2x + 1)$, $[a, b] = [2, 20]$, $k = 3$

16. $f(t) = 3t^2 - 10t + 2$, $[a, b] = [-1, 3]$, $k = 1$

1.16 Intermediate Value Theorem (IVT)

Test Prep

17. Let f be a continuous function such that $f(1) = 7$ and $f(7) = 1$. Let g be the function given by $g(x) = f(x) - x$. Explain why there must be a value c for $1 < c < 7$ such that $g(c) = 0$.

18. The function f is continuous on the closed interval $[1, 3]$ and has values that are given in the table below.

x	1	2	3
$f(x)$	2	k	3

The equation $g(x) = 1$ must have at least two intersections with f in the interval $[1, 3]$ if $k =$

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

19. Suppose f is continuous on the closed interval $[0, 4]$ and suppose $f(0) = 1, f(1) = 2, f(2) = 0, f(3) = -3, f(4) = 3$. Which of the following statements about the zeros of f on $[0, 4]$ is always true?

- (A) f has exactly one zero on $[0, 4]$.
- (B) f has more than one zero on $[0, 4]$.
- (C) f has more than two zeros on $[0, 4]$.
- (D) f has exactly two zeros on $[0, 4]$.