1.16 Intermediate Value Theorem (IVT)

Calculus Name: _____ **CA #1**

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

x	0	2	4	7	10
$f(x)$	-100	-1	-3	2	-5

1. On the interval $0 \le x \le 2$, must there be a value of x for which $f(x) = -4$? Explain.

2. On the interval $0 \le x \le 10$ what is the minimum number of zeros?

3. For $2 \le x \le 7$, what is the fewest possible times $f(x) = 1$?

4. For $0 \le x \le 7$, what is the fewest possible times $f(x) = -2$?

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

x	-5	10	17	20	30
$g(x)$	2	6	-5	9	1

5. On the interval $10 \le x \le 17$, must there be a value of x for which $g(x) = 2$? Explain.

6. On the interval $-5 \le x \le 30$ what is the minimum number of zeros?

7. For $17 \le x \le 30$, what is the fewest possible times $f(x) = 10$?

8. For $-5 \le x \le 20$, what is the fewest possible times $f(x) = 3$?

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

9. $f(x) = 10 - x^2$, $[a, b] = [-1, 3]$, $k = 5$

10. $g(x) = \frac{1}{x^2}$, $[a, b] = \left[\frac{1}{2}, 3\right]$, $k = 2$

Answers to 1.16 CA #1

1. i. f is continuous on $[0, 2]$. ii. $f(0) = -100, f(2) = -1$ $f(0) \neq f(2)$ iii. $k = -4$ is between $f(0)$ and $f(2)$. **∴ IVT applies and there exists a value c between $(0, 2)$ such that $f(c) = -4$.** 2. 2 3. 1 4. 3	5. i. g is continuous on $[10, 17]$. ii. $g(10) = 6, g(17) = -5$ $g(10) \neq g(17)$ iii. $k = 2$ is between $g(10)$ and $g(17)$. **∴ IVT applies and there exists a value c between $(10, 17)$ such that $g(c) = 2$.** 6. 2 7. 0 8. 3	9. i. f is continuous on $[-1, 3]$. ii. $f(-1) = 9, f(3) = 1$ $f(-1) \neq f(3)$ iii. $k = 5$ is between $f(-1)$ and $f(3)$. **∴ IVT applies and there exists a value c between $(-1, 3)$ such that $f(c) = 5$.**	10. i. g is continuous on $\left[\frac{1}{2}, 3\right]$. ii. $g\left(\frac{1}{2}\right) = 4, g(3) = \frac{1}{9}$ $g\left(\frac{1}{2}\right) \neq g(2)$ iii. $k = 2$ is between $g\left(\frac{1}{2}\right)$ and $g(3)$. **∴ IVT applies and there exists a value c between $\left(\frac{1}{2}, 3\right)$ such that $g(c) = 2$.**