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. What is the minimum number of zeros f must have on the interval $0 \le x \le 10$?

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

4. For $0 \le x \le 7$, what is the fewest possible number of 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. What is the minimum number of zeros g must have on the interval $-5 \le x \le 30$?

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

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

Use the Intermediate Value Theorem to answer each problem.

9. If $f(x) = 10 - x^2$, will $f(x) = 5$ on the interval $[-1, 3]$? Explain.

10. If $g(x) = \frac{1}{x^2}$, will $g(x) = 2$ on the interval $\left[\frac{1}{2}, 3\right]$? Explain.

Answers to 1.16 CA #1

1. $f(0) = -100, f(2) = -1$. By the IVT, there is a value c such that $f(c) = -4$ and $0 \le c \le 2$.	2. 2	3. 1	4. 3	5. $g(10) = 6, g(17) = -5$. By the IVT, there is a value c such that $f(c) = 2$ and $10 \le c \le 17$.
6. 2	7. 0	8. 3	9. $f(x)$ is continuous. $f(-1) = 9$ and $f(3) = 1$ By the IVT, there is a value c such that $f(c) = 5$ and $-1 \le c \le 3$.	10. $g(x)$ is continuous on the interval $\left[\frac{1}{2}, 3\right]$. $g\left(\frac{1}{2}\right) = 4$ and $g(3) = \frac{1}{9}$ By the IVT, there is a value c such that $g(c) = 2$ and $\frac{1}{2} \le c \le 3$.