1.4 Continuity

Calculus   Name: _____

Identify and classify each point of discontinuity of the given function.

1. $f(x) = \frac{7x-3}{3}$

2. $f(x) = \frac{x^2}{2x^2-5x}$

3. $f(x) = \frac{7x}{7x-3}$

4. $f(x) = \sqrt{8-2x}$

5. $f(x) = \begin{cases} 8x-7, & x \le 3 \\ x+15, & x > 3 \end{cases}$

6. $f(x) = \begin{cases} x^2-5x-6, & x < -2 \\ 6-x, & x > -2 \\ 1, & x = -2 \end{cases}$

7. $f(x) = \begin{cases} 2\ln x, & x < 4 \\ \ln x^2, & x \ge 4 \end{cases}$

Find the domain of each function.

8. $s(x) = \frac{\sqrt{4x-5}}{2}$

9. $g(x) = x^2 - x + 12$

10. $h(t) = \frac{\sqrt{t+16}}{t-2}$

11. $v(t) = \frac{2t}{t\sqrt{t-8}}$

12. $g(x) = \frac{x-9}{x^2+4x-5}$

13. $f(x) = \frac{5}{10-\sqrt{x}}$

Below is a table of values for a continuous function f. Use this table to answer questions 14-15.

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

14. On the interval $0 \leq x \leq 10$, must there be a value of x for which $f(x) = -4$? Explain.

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

Below is a table of values for a continuous function g. Use this table to answer questions 16-17.

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

16. On the interval $-5 \leq x \leq 30$, must there be a value of x for which $g(x) = 10$? Explain.

17. What is the minimum number of zeros g must have on the interval $-5 \leq x \leq 30$?

Answers to 1.4 CA #1

1. Continuous function	2. Hole at $x = 0$ VA at $x = \frac{5}{2}$	3. VA at $x = \frac{3}{7}$	4. Continuous on its domain.	5. jump disc. at $x = 3$	6. Hole at $x = -2$
7. Continuous on its domain.	8. $x \geq \frac{5}{4}$	9. All real numbers	10. $t \geq -16$, $t \neq 2$	11. $t > 8$	12. All reals, $x \neq 1$, $x \neq -5$	13. $x \geq 0$, $x \neq 100$

14. Yes. On the interval $0 \leq x \leq 2$, the function changes from -100 to -1 and on the interval $7 \leq x \leq 10$, the function changes from 2 to -5. f must equal -4 at some point in those intervals by way of the Intermediate Value Theorem.	15. 2
16. No. The highest value of g from the table is 9. While g might equal 10, we can't guarantee it through the IVT.	17. 2