

Practice Test G: Limits, Continuity, IVT

Name: _____

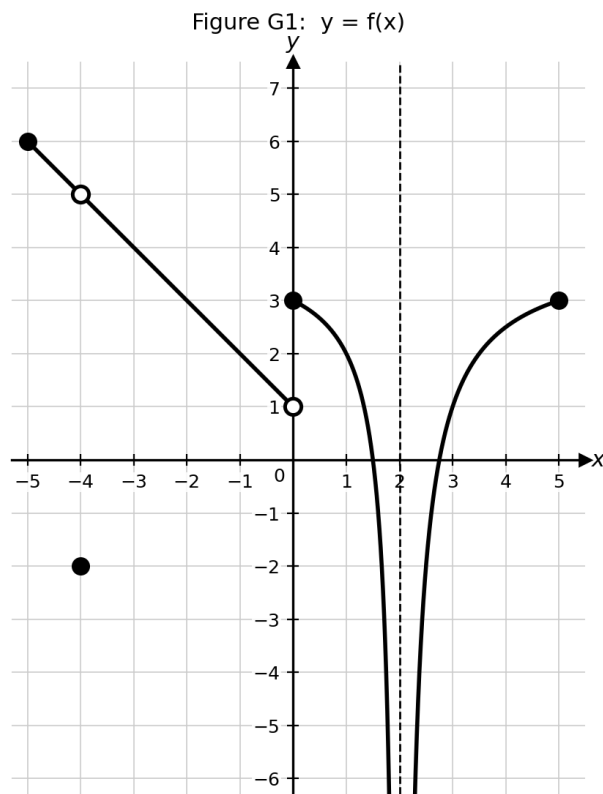
Time: 60 minutes No calculator 100 points

Answer exactly the question asked. Show work on every problem in Parts III–V.

If a limit is infinite, write ∞ or $-\infty$. If a limit does not exist for any other reason, write DNE.

If a function value does not exist, write *undefined*.

Part I. Graph. Questions 1(a)–1(g) refer to Figure G1.



1. Use the figure to find each value.

(a) $\lim_{x \rightarrow 2} f(x)$ _____

(b) $\lim_{x \rightarrow 2^+} f(x)$ _____

(c) $f(-4)$ _____

(d) $f(2)$ _____

(e) $\lim_{x \rightarrow 0^+} f(x)$ _____

(f) $\lim_{x \rightarrow 0} f(x)$ _____

(g) $\lim_{x \rightarrow -4} f(x)$ _____

(2 pts each, 14 pts)

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Part II. Table.

2. The table gives values of k . Assume the pattern continues as x approaches 2. **(2 each, 6 pts)**

x	1.9	1.99	1.999	2	2.001	2.01	2.1
$k(x)$	10	100	1000	-1	-1000	-100	-10

(a) $\lim_{x \rightarrow 2^-} k(x)$ _____ (b) $\lim_{x \rightarrow 2} k(x)$ _____ (c) $k(2)$ _____

Part III. Algebra. Show work.

3. Evaluate $\lim_{t \rightarrow 1} \frac{t^2 + 4t + 3}{t^2 - t - 2}$, if it exists. **(5 pts)**

4. Evaluate $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 3}$, if it exists. **(5 pts)**

5. Evaluate $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 6x + 8}$, if it exists. **(6 pts)**

6. Let $h(x) = \frac{x - 6}{x - 1}$. Evaluate each limit. **(3 each, 9 pts)**

(a) $\lim_{x \rightarrow 1^-} h(x)$ (b) $\lim_{x \rightarrow 1^+} h(x)$ (c) $\lim_{x \rightarrow 1} h(x)$

7. Let $q(x) = \begin{cases} x^2 + 1 & x \leq 0 \\ 4 - x & x > 0 \end{cases}$ (2 each, 10 pts)
- (a) $\lim_{x \rightarrow 3} q(x)$ (b) $\lim_{x \rightarrow 0^-} q(x)$ (c) $\lim_{x \rightarrow 0^+} q(x)$ (d) $\lim_{x \rightarrow 0} q(x)$ (e) $q(0)$

8. Let $r(x) = \frac{\sqrt{x+4} - 3}{x-5}$. Find $r(5)$, if it is defined. (3 pts)

Part IV. Continuity. For 9 and 10, check each of the three conditions in the definition of continuity at a point and state your conclusion.

9. Using Figure G1, determine whether f is continuous at $x = -2$. (6 pts)

10. Let $h(x) = \begin{cases} x^2 - 2 & x \leq 0 \\ -2x - 2 & x > 0 \end{cases}$
- Determine whether h is continuous at $x = 0$. (6 pts)

11. Using Figure G1, is f continuous on the closed interval $[-2, 0]$? Explain. (4 pts)

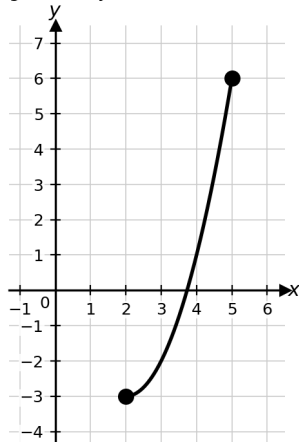
12. Let $q(x) = \frac{x+1}{2x^2 - 13x + 15}$. (3 each, 6 pts)
- (a) Is q continuous on $[1, 2]$? Explain. (b) Is q continuous on $[3, 5]$? Explain.

Part V. Intermediate Value Theorem.

13. The function $h(x) = 2x^3 - 5x + 5$ is continuous on $[-2, 1]$. Find $h(-2)$. (2 pts)
14. Let $f(x) = x^2$ on the interval $[-1, 2]$. Does the Intermediate Value Theorem guarantee a number c in $(-1, 2)$ with $f(c) = 0$? If it does, find every such c in $(-1, 2)$. (6 pts)

15. Figure G2 shows the graph of r on its domain $[2, 5]$. Does the Intermediate Value Theorem guarantee a number c in $[2, 5]$ with $r(c) = -2$? If it does, find c . Explain. (4 pts)

Figure G2: $y = r(x)$, domain $[2, 5]$



16. True or False. Circle one. (4 each, 8 pts)
- (a) **T** **F** If f is continuous on $[-3, 2]$, $f(-3) = -2$, and $f(2) = 3$, then there is exactly one number c in $[-3, 2]$ with $f(c) = 0$.
- (b) **T** **F** If g is continuous on $[1, 2]$, $g(1) = 1$, and $g(2) = 1$, then there is no number c in $(1, 2)$ with $g(c) = 9$.