

Practice Test F: Limits, Continuity, IVT

Name: _____

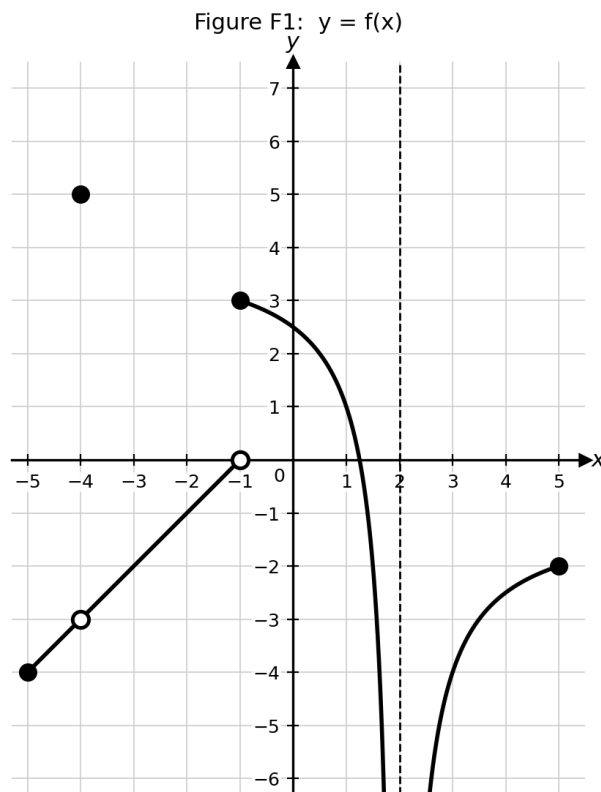
Time: 60 minutes No calculator 100 points

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 F1.



1. Use the figure to find each value.

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

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

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

(d) $f(2)$ _____

(e) $\lim_{x \rightarrow -1^-} f(x)$ _____

(f) $\lim_{x \rightarrow -1} f(x)$ _____

(g) $f(-4)$ _____

(2 pts each, 14 pts)

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Part II. Table.

2. The table gives values of g . Assume the pattern continues as x approaches 3. **(2 each, 6 pts)**

x	2.9	2.99	2.999	3	3.001	3.01	3.1
$g(x)$	0.9	0.99	0.999	1	-5.001	-5.01	-5.1

(a) $\lim_{x \rightarrow 3^-} g(x)$ _____ (b) $\lim_{x \rightarrow 3} g(x)$ _____ (c) $g(3)$ _____

Part III. Algebra. Show work.

3. Evaluate $\lim_{t \rightarrow 0} \frac{t^2 + t - 12}{t^2 + 2t - 15}$, if it exists. **(5 pts)**

4. Evaluate $\lim_{x \rightarrow 0} \frac{\sqrt{x} - 3}{x - 7}$, if it exists. **(5 pts)**

5. Evaluate $\lim_{x \rightarrow -3} \frac{x^3 + x^2 + 18}{x^2 - 9}$, if it exists. **(6 pts)**

6. Let $g(x) = \frac{x+4}{x-4}$. Evaluate each limit. **(3 each, 9 pts)**

(a) $\lim_{x \rightarrow 4^-} g(x)$ (b) $\lim_{x \rightarrow 4^+} g(x)$ (c) $\lim_{x \rightarrow 4} g(x)$

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

8. Let $w(x) = \frac{\sqrt{x+5} - 3}{x-4}$. Find $w(4)$, 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 F1, determine whether f is continuous at $x = -1$. (6 pts)

10. Let $k(x) = \begin{cases} 2x - 5 & x < 3 \\ x^2 - 5 & x \geq 3 \end{cases}$
- Determine whether k is continuous at $x = 3$. (6 pts)

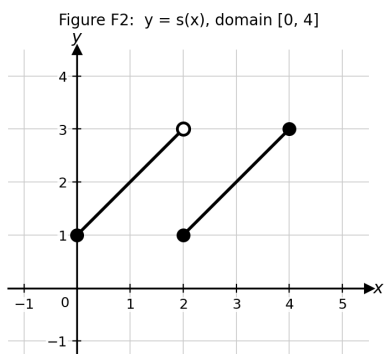
11. Using Figure F1, is f continuous on the closed interval $[-1, 1]$? Explain. (4 pts)

12. Let $u(x) = \frac{x+3}{x^2-3x-4}$. (3 each, 6 pts)
- (a) Is u continuous on $(4, 6]$? Explain. (b) Is u continuous on $[2, 4]$? Explain.

Part V. Intermediate Value Theorem.

13. The function $h(x) = x^3 + 3x^2 - 4x + 6$ is continuous on $[-1, 3]$. Find $h(-1)$. (2 pts)
14. Let $f(x) = x^2 - 7x$ on the interval $[-2, 1]$. Does the Intermediate Value Theorem guarantee a number c in $[-2, 1]$ with $f(c) = 0$? If it does, find every such c in $[-2, 1]$. (6 pts)

15. Figure F2 shows the graph of s on its domain $[0, 4]$. Does the Intermediate Value Theorem guarantee a number c in $(0, 4)$ with $s(c) = 2$? If it does, find c . Explain. (4 pts)



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