

Practice Test L: Answer Key and Rubric

Tutor copy. Every answer was checked by symbolic computation (SymPy). All problems are original; see the notes file for provenance. Prepared with assistance from Claude, an AI model made by Anthropic.

General grading rules

- **Answer-only items** (Part I, Part II, Q13, Q16): all or nothing.
- **Infinite limits.** The instruction box tells students to write ∞ or $-\infty$. “DNE” for a limit whose answer is ∞ or $-\infty$ earns 1 point of the item’s value. A wrong sign earns 0. Where one side is ∞ and the other $-\infty$, the answer is DNE and “ ∞ ” earns 0.
- **Function-value items** (Q1 value parts, Q2(c), Q7(e), Q8, Q13): writing the *limit* where the function value was asked earns 0. “Undefined,” “not defined,” or “does not exist” are all accepted for an undefined value.
- **Show-work items** (Parts III–V): a bare correct answer earns at most half credit.
- **Method is not graded for efficiency.** A correct answer reached by long but valid algebra gets full credit. The time it costs is the penalty.

Test L

Item	Answer	Rubric / trap
1(a)	DNE	$\lim_{x \rightarrow -1} f(x)$. One-sided limits differ.
1(b)	-1	$f(-4)$. <i>Trap</i> : function value; read the closed dot (or its absence), not the curve.
1(c)	0	$\lim_{x \rightarrow -1^+} f(x)$.
1(d)	undefined	$f(2)$. <i>Trap</i> : function value; read the closed dot (or its absence), not the curve.
1(e)	-3	$\lim_{x \rightarrow -4} f(x)$.
1(f)	DNE	$\lim_{x \rightarrow 2} f(x)$. One-sided limits differ.
1(g)	$-\infty$	$\lim_{x \rightarrow 2^-} f(x)$.
2(a)	∞	<i>Trap</i> : “-” means from the left: the left half of the table.
2(b)	DNE	
2(c)	-1	Function value read directly from the middle column.
3	$\frac{1}{2}$	Direct substitution; 2 setup, 3 value. <i>Trap</i> : the shared factor $(x+4)$ pulls students into factoring, which also works but costs time.
4	0	Direct substitution. “0/0,” “undefined,” “DNE”: 0 pts. Rationalizing is valid but slow.
5	1	1 pt notes 0/0; 3 pts synthetic division by -1 on 1, 4, 4, 1 giving $x^2 + 3x + 1$, and denominator $(x+1)(x)$; 2 pts value.
6	(a) $-\infty$ (b) ∞ (c) DNE	3 each; sign reasoning required for full credit.
7	(a) 4 (b) 3 (c) 0 (d) DNE (e) 0	2 each. <i>Trap in (a)</i> : $x = 2$ uses the second piece; the first piece gives 7. <i>Trap in (e)</i> : function value.
8	undefined	$\frac{0}{0}$. <i>Trap</i> : simplifying gives the limit $\frac{1}{4}$; that answer earns 0.
9	Not continuous	(1) $f(-1) = 0$; (2) left limit 3, right limit 0, so the limit does not exist; (3) fails. 2 pts per condition.

Item	Answer	Rubric / trap
10	Not continuous	(1) $h(0)$ is undefined (neither piece includes $x = 0$); (2) the limit is 3; (3) cannot hold. <i>Trap</i> : the limit exists, so students say continuous. 2 pts per condition.
11	Yes	At the endpoint $x = -1$ the definition needs continuity from the right: $\lim_{x \rightarrow -1^+} f(x) = 0$ and $f(-1) = 0$. The jump is on the side outside the interval. 2 answer, 2 reason.
12	(a) Yes (b) No	Denominator zero at 1, 6. Each part: 1 answer, 2 reason. <i>Trap</i> : the numerator zero $x = 3$ is irrelevant; watch closed versus open brackets.
13	-20	<i>Trap</i> : IVT heading; only a value is asked. Watch signs of negative inputs.
14	Yes; $c = 4$	2 continuity (polynomial); 2 $f(2) = 10$, $f(5) = 40$, and 28 is between; 2 solve $f(x) = 28$: $x = 4$ or $x = -7$, keep 4 only.
15	No	s has a jump at $x = 3$, so the IVT does not apply; in fact the graph skips over 3.5. 2 answer, 2 reason.
16(a)	T	True. Continuous, with a negative value at one end and a positive value at the other.
16(b)	F	False. 0 is not between the endpoint values, so the IVT says nothing. Counterexample: the linear function through the two endpoint points never reaches 0 on the interval. <i>Trap</i> : reading “continuous” and answering T without checking betweenness.

Points: $14 + 6 + 5 + 5 + 6 + 9 + 10 + 3 + 6 + 6 + 4 + 6 + 2 + 6 + 4 + 8 = 100$.

Interval notation in IVT items. Q14 and Q16(b) use a closed interval $[a, b]$ for c ; Q15 and Q16(a) use the open interval (a, b) . The mix is deliberate. In every item the target value differs from both endpoint values, so no endpoint can be a solution and the choice of bracket never changes an answer.