

Practice Test C: 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 C

Item	Answer	Rubric / trap
1(a)	$-\infty$	
1(b)	DNE	Left $-\infty$, right ∞ . <i>Trap</i> : “ ∞ ” because the curve shoots up on the near side; earns 0.
1(c)	undefined	<i>Trap</i> : function value at an asymptote.
1(d)	1	
1(e)	-1	Open dot at $(0, -1)$.
1(f)	0	<i>Trap</i> : function value; closed dot at $(3, 0)$ sits on the x -axis, and students distrust 0.
1(g)	2	Hole at $(3, 2)$.
2(a)	4	<i>Trap</i> : “+” means from the right: right half of the table.
2(b)	4	
2(c)	undefined	Read directly from the table. Answer 4 earns 0.
3	$\frac{1}{2}$	Direct substitution: $\frac{1-4}{1-1-6} = \frac{-3}{-6}$. 2 setup, 3 value. <i>Trap</i> : the drilled version approaches 2 and is $0/0$; this one approaches -1 . Factoring and canceling $(x-2)$ also gives $\frac{x+2}{x+3} \rightarrow \frac{1}{2}$ (full credit, slower).
4	$\frac{1}{4}$	Direct substitution: $\frac{\sqrt{16-2}}{8} = \frac{2}{8}$. <i>Trap</i> : looks like the rationalize-the-numerator problem; the denominator is $x-4$, not $x-12$. “ $0/0$ ”, “undefined”, “DNE”: 0 pts.
5	$\frac{1}{2}$	1 pt notes $0/0$; 3 pts synthetic division by 1 on 1, 2, -5 , 2 giving $x^2 + 3x - 2$, and denominator $(x-1)(x+3)$; 2 pts $\frac{1+3-2}{1+3}$. <i>Trap</i> : the quotient does not factor, so students who try to factor it further lose time.
6	(a) ∞ (b) $-\infty$ (c) DNE	3 each; sign reasoning required. Numerator $\rightarrow -2$; $x^2 - 9 < 0$ just left of 3, > 0 just right. <i>Trap</i> : the negative numerator flips both signs.

Item	Answer	Rubric / trap
7	(a) 1 (b) 3 (c) 3 (d) 3 (e) 7	2 each. <i>Trap in (a):</i> $x = 4 > 2$ uses $5 - x$; $x^2 - 1$ gives 15. <i>Trap in (e):</i> the separately listed value $p(2) = 7$; answering 3 earns 0.
8	undefined	$w(4) = \frac{16-16}{0} = \frac{0}{0}$. <i>Trap:</i> canceling gives $x \rightarrow 4$, the limit, not $w(4)$. Answer 4 earns 0.
9	Not continuous	(1) $f(3) = 0$ defined; (2) $\lim_{x \rightarrow 3} f(x) = 2$; (3) $2 \neq 0$. 2 pts per condition.
10	Not continuous	(1) $h(1) = 4$; (2) left $2 + 3 = 5$, right $1 + 4 = 5$, limit 5; (3) $5 \neq 4$. 2 pts per condition. The limit exists; only condition 3 fails.
11	No	Closed-interval definition: f must be continuous from the right at $x = 0$. $f(0) = 1$ but $\lim_{x \rightarrow 0^+} f(x) = -1$. 2 answer, 2 reason. <i>Trap:</i> the curve is unbroken inside $(0, 2)$; the failure is at the endpoint.
12	(a) No (b) Yes	Denominator $(x-4)(x+3)$ is zero at 4 and -3 . (a) $q(-3)$ is undefined and $-3 \in [-3, 0]$. (b) Neither 4 nor -3 is in $[-2, 3]$. <i>Trap:</i> the numerator zero $x = -2$ is irrelevant. 3 each.
13	-8	$27 - 36 + 1$. <i>Trap:</i> IVT heading; only a value is asked.
14	Yes; $c = 2$	2 continuity (polynomial); 2 $f(0) = 0 < 8 < 15 = f(3)$; 2 solve $x^2 + 2x - 8 = (x+4)(x-2) = 0$, keep 2, reject -4 .
15	No	r is not continuous on $[0, 4]$ (jump at $x = 2$), so IVT does not apply and guarantees nothing. 2 answer, 2 reason. <i>Trap:</i> the graph does reach 2 (at $x = 1$ and $x = 3$); “Yes, $c = 1$ ” earns 0, because the question asks what the theorem guarantees.
16(a)	T	Continuous on $[0, 4]$ and 0 is between -3 and 5.
16(b)	F	IVT says nothing when its hypothesis fails. Counterexample: $f(x) = 4 - 2x$ on $[1, 2]$, $f(x) = 5$ on $(2, 3)$, $f(3) = -2$; then $f(2) = 0$.

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

Interval notation in IVT items. Q15 and Q16(a) use a closed interval $[a, b]$ for c ; Q14 and Q16(b) 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.