LESSON MAKER PRO

Limit Checkpoint

Use limits to test what a function approaches and whether it is continuous.

HIGH SCHOOL · MA.912.C.1

MA.912.C.1 "Develop an understanding for limits and continuity. Determine limits and continuity."

NAME _____ DATE _____

APPROACH AND CONNECT

A limit is the value a function approaches as x gets close to a number. A function is continuous at a number when the left-hand limit, right-hand limit, and function value are all the same.

WORKED EXAMPLE

Find lim x->8 $(x^2 - 64)/(x - 8)$.

1. Substitution gives 0/0, so factor $x^2 - 64$ as $(x - 8)(x + 8)$.
2. Cancel $x - 8$ for $x \neq 8$.
3. Evaluate $x + 8$ at $x = 8$: $8 + 8 = 16$.

Answer: 16

PRACTICE 6 problems

1 Find lim x->4 (x + 5).

ANSWER _____

2 Find lim x->5 $(x^2 - 25)/(x - 5)$.

ANSWER _____

3 $f(x) = (x^2 - 36)/(x - 6)$ for $x \neq 6$, and $f(6) = 12$. Is f continuous at x = 6?

ANSWER _____

4 $g(x) = 3x - 1$ for $x < 2$, and $g(x) = x + 3$ for $x \geq 2$. Find lim x->2 g(x).

ANSWER _____

5 $h(x) = x + 4$ for $x < 1$, and $h(x) = 2x + 3$ for $x \geq 1$. Is h continuous at x = 1?

ANSWER _____

6 Find lim x->-3 1/(x + 3).

ANSWER _____

APPLY IT Show your work

1 A game app models a bonus meter with $B(r) = (r^2 - 49)/(r - 7)$, where r is time in minutes and r != 7. Find lim r->7 B(r), the bonus-meter value the model approaches at 7 minutes.

WORK SPACE

ANSWER _____

2 A music-streaming app models a listener's status score by $P(m) = 2m + 3$ for $m < 4$, and $P(m) = m^2 - 5$ for $m >= 4$, where m is time in months. Is the model continuous at m = 4?

WORK SPACE

ANSWER _____

CHALLENGE One step up

$f(x) = (x^2 - 100)/(x - 10)$ for x != 10, and f(10) = k. Find k so that f is continuous at x = 10.

WORK SPACE AND ANSWER

Limit Checkpoint

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find lim x->4 (x + 5).	**9**
2	Find lim x->5 (x^2 - 25)/(x - 5).	**10**
3	f(x) = (x^2 - 36)/(x - 6) for x != 6, and f(6) = 12. Is f continuous at x = 6?	**Yes, f is continuous at x = 6.**
4	g(x) = 3x - 1 for x < 2, and g(x) = x + 3 for x >= 2. Find lim x->2 g(x).	**5**
5	h(x) = x + 4 for x < 1, and h(x) = 2x + 3 for x >= 1. Is h continuous at x = 1?	**Yes, h is continuous at x = 1.**
6	Find lim x->-3 1/(x + 3).	**DNE**

PART 2 · APPLY IT

1. **14** Factor r^2 - 49 as (r - 7)(r + 7), then cancel r - 7. The simplified expression is r + 7, which approaches 14 as r approaches 7.
2. **Yes, the model is continuous at m = 4.** The left-hand limit is lim m->4- (2m + 3) = 11. The right-hand limit and P(4) are both 4^2 - 5 = 11, so the model is continuous.

CHALLENGE

k = 20

Accept equivalent simplified expressions and clear limit notation. For problem 6, accept DNE or "does not exist" because the one-sided limits are different.