

Continuity and Discontinuity

Julia: What does it mean for a graph to be discontinuous? I don't get it!

Dylan: I think it's like when there's a hole in the graph or something.

James: Actually there are different kinds of discontinuities, but it's hard to visualize so let's take a look!

Altogether: LET'S DIVE IN!

Introduction

Question 1 A function f is said to be *continuous at a point* $x = a$ if which three conditions are satisfied?

Select All Correct Answers:

- (a) $f(a)$ is defined ✓
- (b) $f(a) \neq 0$
- (c) $\lim_{x \rightarrow a} f(x)$ exists ✓
- (d) $\lim_{x \rightarrow a} f(x) = f(a)$ ✓
- (e) $f(x)$ is linear
- (f) $f(x) \neq f(a)$

Example

Take the function $f(x) = \frac{(1-x)^2}{1-x}$.

Through some simple elimination, we can easily see that this function is equivalent to $1-x$, where $x \neq 1$. Thus, there is one point on the original function we should pay close attention to: $x = 1$

Learning outcomes: