

# 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)  $f(x) \neq f(a)$

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## 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:  $x = 1$

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Learning outcomes: