# 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) $\lim_{x \to a} f(x)$ *exists* ✓

(d) $\lim_{x \to a} f(x) = f(a)$ ✓

(e) $f(x)$ *is linear*

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

### Example

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

Graph of $\dfrac{(1-x)^2}{1-x}$

Learning outcomes:

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: $x = 1$