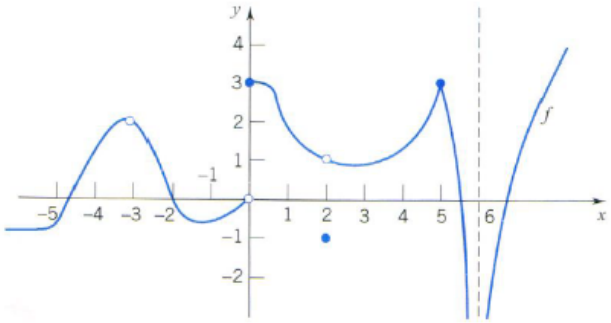
Continuity

Continuity of a graph is loosely defined as the ability to draw a graph without having to lift your pencil. To better understand this, see the graph below:



Let's investigate at the flowing points:

$x = -3$ Discontinuous at this point *The value is not defined at -3* "Removable discontinuity"	$x = 0$ Discontinuous at this point *The limit of the left is not equal to the limit from the right* "Jump discontinuity"	$x = 2$ Discontinuous at this point *The limit from the left is equal to the right, but is not equal to the value of the function* "Removable discontinuity"
$x = 4$ Continuous at this point *The limit from the left is equal to the limit from the right and equal to the value of the function*	$x = 5$ Continuous at this point *The limit from the left is equal to the limit from the right and equal to the value of the function*	$x = 6$ Discontinuous at this point *The value of the limit is equal to negative infinity and therefore not defined* "Infinite discontinuity"

A More Formal Definition of Continuity

From this information, a more formal definition can be found. Continuity, at a point a, is defined when the limit of the function from the left equals the limit from the right and this value is also equal to the value of the function. Using notation, for all points a where

$$lim_{x \to a^+} f(x) = lim_{x \to a^-} f(x) = f(a),$$

the function is said to be ***continuous***.