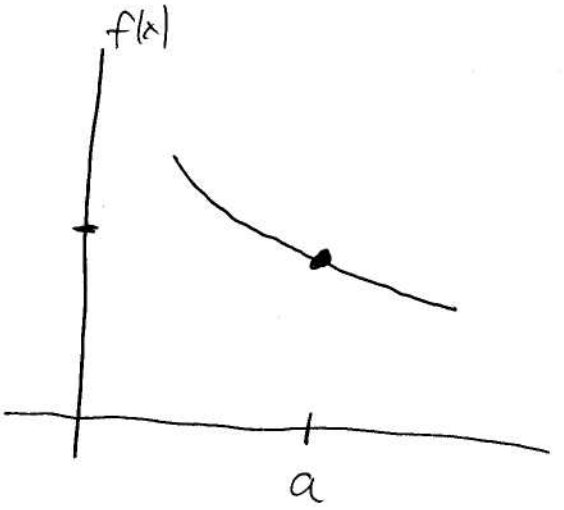
Calc BC Section 2.3 Notes Continuity

A function $f(x)$ is continuous at point a if $\lim_{x\to a^+} = \lim_{x\to a^-} = f(a)$.

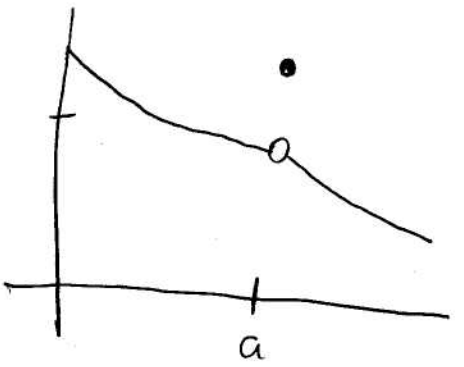


$\lim_{x\to a^-} f(x) = b$

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

$f(a) = b$

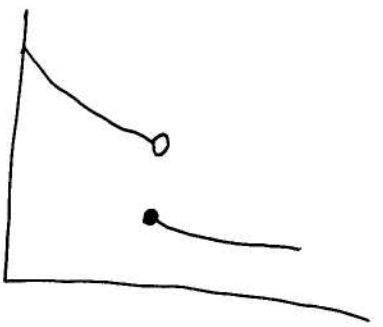
continuous at $x=a$



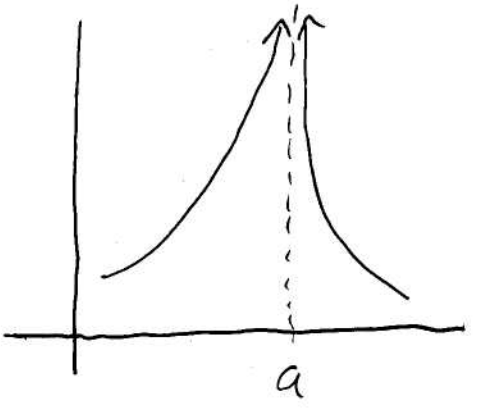
$\lim_{x\to a^-} = \lim_{x\to a^+} \neq f(a)$

discontinuous at $x=a$

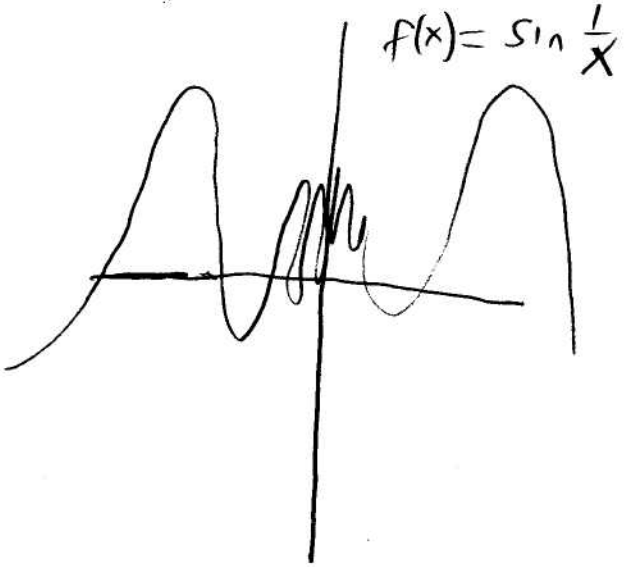
point discontinuity



Jump discontinuity



Infinite Discontinuity



Oscilating discontinuity

Removing a discontinuity

$$f(x) = \frac{x^2 + 9x - 36}{x - 3} =$$

$$\lim_{x \to 3} f(x) = \lim_{x \to 3} \frac{(x-3)(x+12)}{x-3} = \lim_{x \to 3} (x+12) = 15$$

A point discontinuity can be removed

Composite of Continuous Functions

If f is continuous at $x=c$ and g is continuous at $f(c)$, then $g(f(x))$ is continuous at c.

Ex:

Show that $y = \frac{2x}{\sqrt{x-1}}$ is continuous.

$\sqrt{x-1}$ is continuous on its domain $x \geq 1$. The function y is continuous because it is the quotient of two polynomials which is continuous on their domains.

y is continuous on $x > 1$.