

MA 16010 Lesson 5: (Dis)Continuity

Continuity

A function $f(x)$ is continuous at $x = c$ if:

- _____,
- _____,
- _____.

What can happen when the function is **not** continuous?

1. Holes.

Examples:

$$(a) f(x) = \frac{x^2 - 1}{x - 1}$$

$$(b) f(x) = \begin{cases} \frac{1}{2}x, & x \neq 4 \\ 4, & x = 4 \end{cases}$$

2. Vertical asymptotes.

Examples:

$$(a) f(x) = \frac{1}{(x-2)^2}$$

$$(b) f(x) = \frac{1}{x+1}$$

3. Jumps.

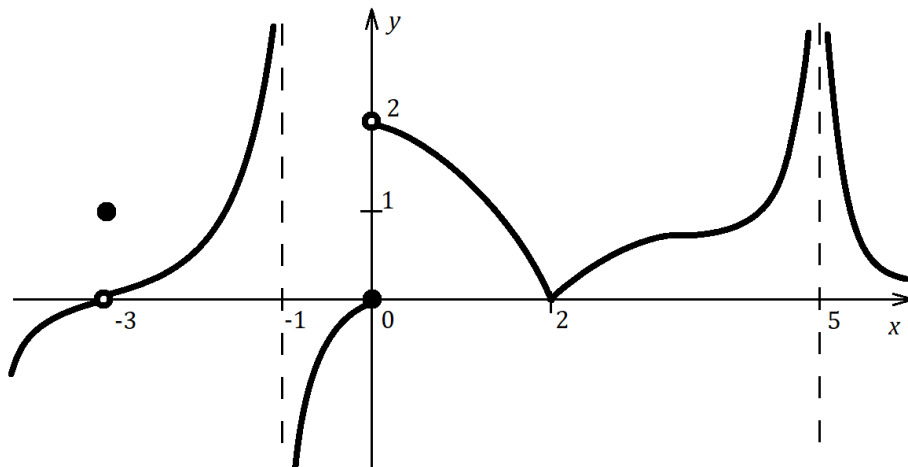
Examples:

$$(a) f(x) = \begin{cases} \sqrt[3]{x}, & x \leq 1 \\ 2x + 1, & x > 1 \end{cases}$$

$$(b) f(x) = \begin{cases} 3x - 1, & x < 2 \\ 3, & x \geq 2 \end{cases}$$

Exercise: Find and classify points of discontinuity:

1.



2.
$$f(x) = \frac{x^2 + 3x - 10}{x^2 + x - 6}$$

3.
$$f(x) = \begin{cases} 2x, & x \leq 2 \\ x^2, & 2 < x \leq 4 \\ \sqrt{x} + 1, & x > 4 \end{cases}$$