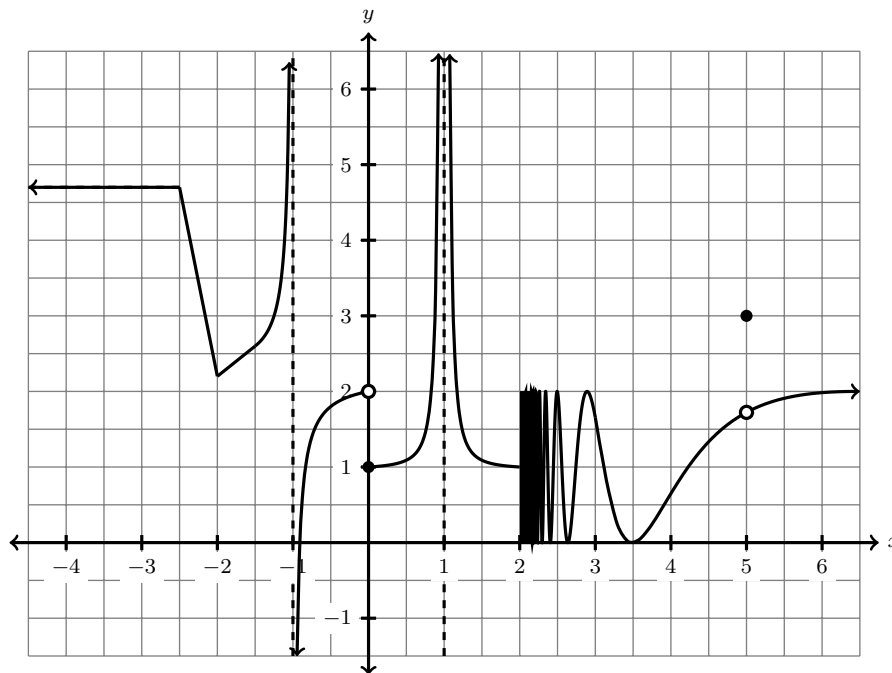AUTHOR 1 _____

AUTHOR 2 _____

AUTHOR 3 _____

06 – Continuity

Definition: Continuity

A function f is **continuous at a number** a if $\lim\limits_{x \to a} f(x) = f(a)$, and both sides exist.

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1. Suppose the graph of $y = f(x)$ is given below. Find all x-values where f is discontinuous.
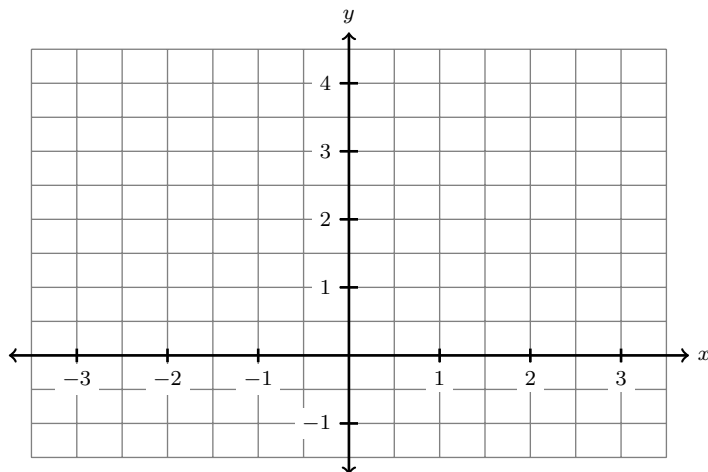

Discontinuous at $x =$ _____

Definition: One-sided Continuity

- A function f is **continuous from the left** at a if $\lim\limits_{x \to a^-} f(x) = f(a)$, and both sides exist.

- A function f is **continuous from the right** at a if $\lim\limits_{x \to a^+} f(x) = f(a)$, and both sides exist.

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2. For the graph of f above, determine if f is continuous from the left, from the right, both, or neither at each of $x = -2, 0, 1$.

3. Sketch the graph of $y = f(x)$ (defined below), and find all values for x where f is discontinuous.

$$f(x) = \begin{cases} x + 1 & \text{if } x < 0 \\ e^x & \text{if } 0 \le x \le 1 \\ 2 - x & \text{if } x > 1 \end{cases}$$

Discontinuous at $x = $ _____

4. For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx^2 + 2x & \text{if } x < 2 \\ x^3 - cx & \text{if } x \ge 2 \end{cases}$$

f is continuous provided $c = $ _____

5. *True or False:* the function $f(x) = \tan(x)$ is continuous on its domain. Make sure to explain!