

Name: _____

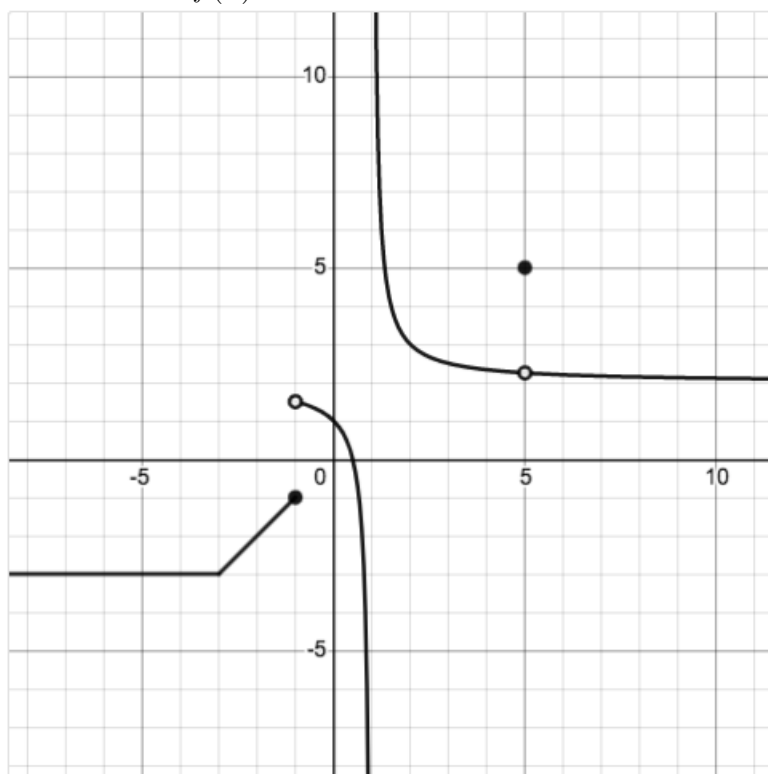
2.6 Differentiability

A function f is *differentiable* at $x = a$ if...

1. Warm-up:

- (a) Sketch a function that is continuous but not differentiable at $x = 0$, or explain why it's not possible.
- (b) Sketch a function that is differentiable but not continuous at $x = 0$, or explain why it's not possible.

2. The function $f(x)$ is shown below:



- (a) At what values is $f(x)$ not continuous?
- (b) At what values is $f(x)$ not differentiable?
- (c) BONUS: Sketch a graph of $f'(x)$.

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3. Let $f(x)$ be given by:

$$f(x) = \begin{cases} kx + b & x < 2 \\ x^2 - 2 & x \geq 2 \end{cases}$$

Find a values of k and b so that f is continuous and differentiable at $x = 2$.

4. A magnetic field, B , is given as a function of the distance, r , from the center of a wire as follows:

$$B = \begin{cases} \frac{r}{r_0} B_0 & \text{for } r \leq r_0 \\ \frac{r_0}{r} B_0 & \text{for } r > r_0 \end{cases}$$

(a) Is B continuous at r_0 ? Explain.

(b) Is B differentiable at r_0 ? Explain.