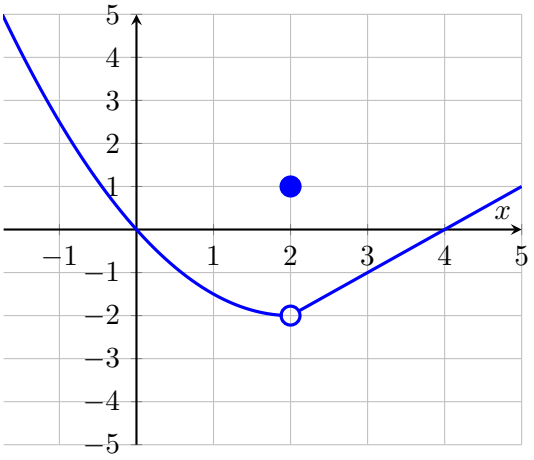
1. The graph below is the function $f(x)$



Determine if each statement below is true or false.

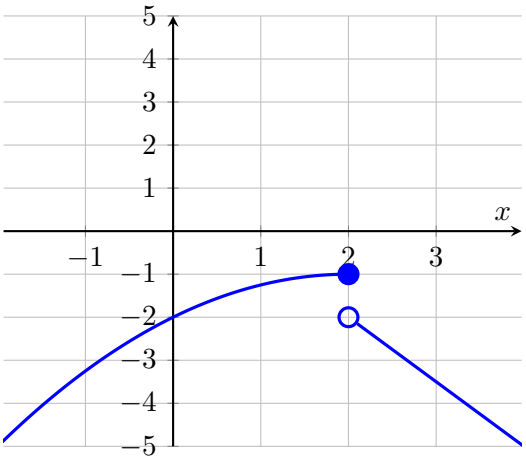
(a) $f(2)$ is defined.

(b) $\lim_{x\to 2} f(x)$ exists.

(c) $\lim_{x\to 2} f(x) = f(2)$

(d) The function is continuous at $x = 2$.

2. The graph below is the function $f(x)$



Determine if each statement below is true or false.

(a) $f(2)$ is defined.

(b) $\lim_{x\to 2} f(x)$ exists.

(c) $\lim_{x\to 2} f(x) = f(2)$

(d) The function is continuous at $x = 2$.

3. Let f be the function defined below.

$$f(x) = \begin{cases} 5x + 10 & \text{if} \quad x < -1 \\ \sqrt{x + 26} & \text{if} \quad x > -1 \\ 2 & \text{if} \quad x = -1 \end{cases}$$

Determine if each statement below is true.

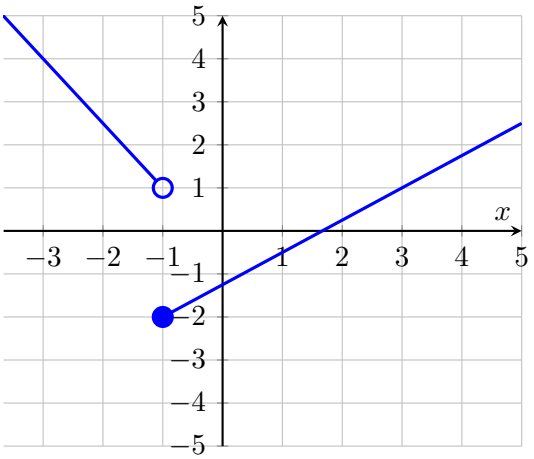
(a) $f(-1)$ is defined.

(b) $\lim_{x \to -1} f(x)$ exists.

(c) $\lim_{x \to -1} f(x) = f(-1)$.

(d) The function is continuous at $x = -1$.

4. The graph below is the function $f(x)$



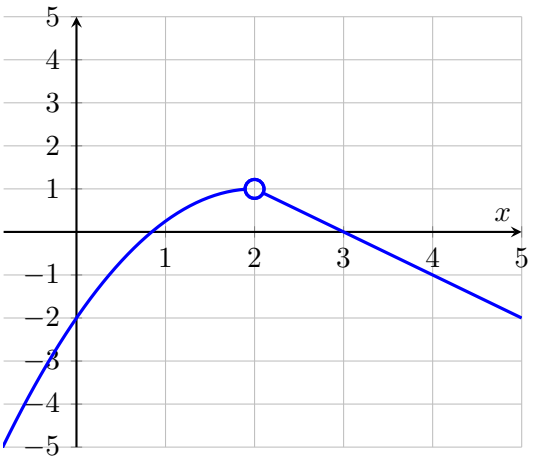
Determine if which rule(s) for continuity is (are) violated at $a = -1$.

(a) $f(a)$ is defined.

(b) $\lim_{x \to a} f(x)$ exists.

(c) $\lim_{x \to a} f(x) = f(a)$

5. The graph below is the function $f(x)$



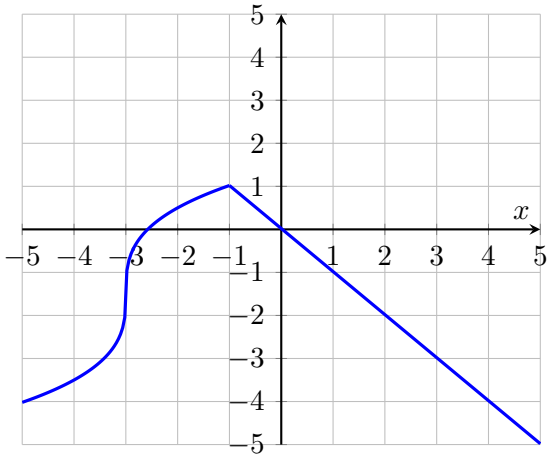
Determine if which rule(s) for continuity is (are) violated at $a = 2$.

(a) $f(a)$ is defined.

(b) $\lim_{x \to a} f(x)$ exists.

(c) $\lim_{x \to a} f(x) = f(a)$

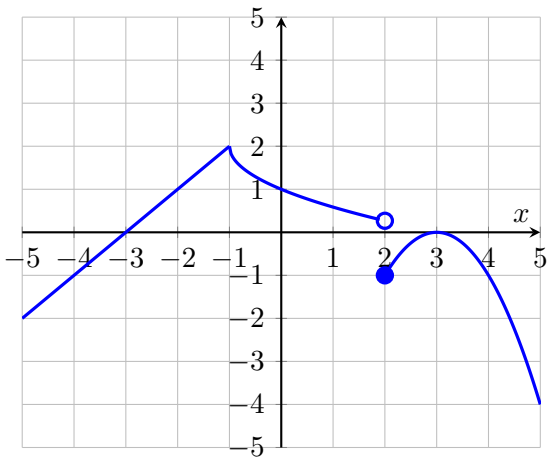
6. Given the graph of the function f below, answer the following questions:



(a) Is the function f continuous function?

(b) List *all* the numbers x at which the function graphed below is not differentiable.

7. Given the graph of the function g below, answer the following questions:



   (a) Is the function g continuous function?

   (b) List *all* the numbers x at which the function graphed below is not differentiable.

8. Determine if each statement below is true or false.

   (a) If f is a differentiable function at $x = a$, then f is continuous at $x = a$.

   (b) If f is continuous at $x = a$, then f is a differentiable function at $x = a$.

   (c) If f is not continuous at $x = a$, then f is not a differentiable function at $x = a$.

Answer Key

1 **(a)** true **(b)** true **(c)** false **(d)** false

2 **(a)** true **(b)** false **(c)** false **(d)** false

3 **(a)** true **(b)** true **(c)** false **(d)** false

4 (b) and (c) are violated.

5 (a) and (c) are violated.

6 **(a)** yes **(b)** $x = -3$ and $x = -1$

7 **(a)** no **(b)** $x = -1$ and $x = 2$

8 **(a)** true **(b)** false **(c)** true