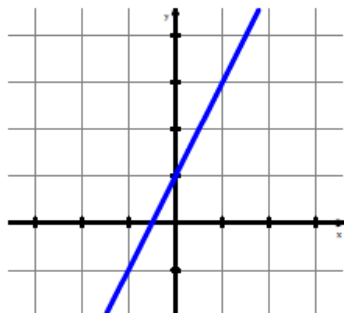


Differentiability and Continuity

A graph of a function is shown below. Write down its equation on line #1.



1. $y =$ _____

2. $y =$ _____

3. $y =$ _____

Differentiability:

The derivative exists for each point in the domain. The graph must be a smooth line or curve for the derivative to exist. In other words, the graph looks like a line if you zoom in.

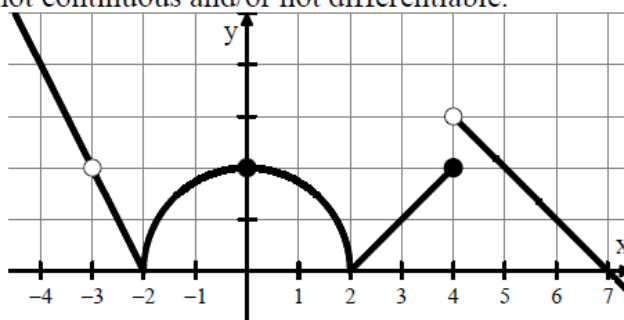
The derivative *fails to exist* where the function has a

1.

2.

3.

Identify points where the function below is not continuous and/or not differentiable.



True or False

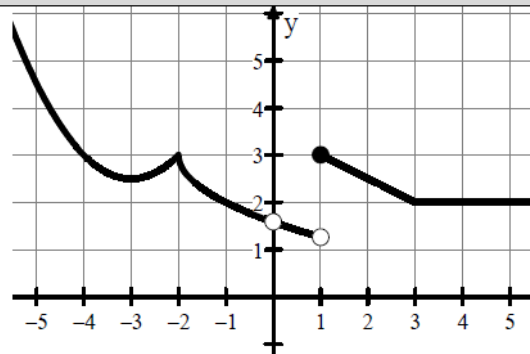
Differentiability implies continuity.

True or False

Continuity implies differentiability.

Identify any x -values of the function that are not continuous and/or not differentiable.

1.

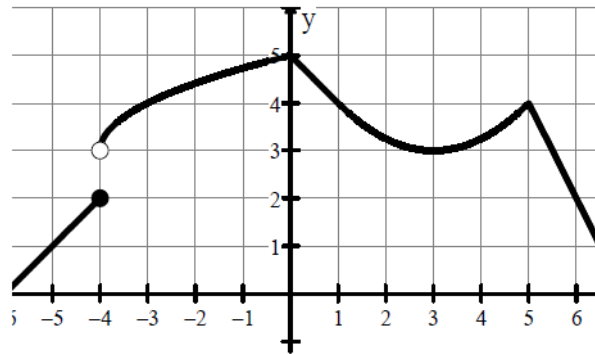


x -values where the function is not continuous.

x -values where the function is continuous, but not differentiable.

Identify any x -values of the function that are not continuous and/or not differentiable.

2.

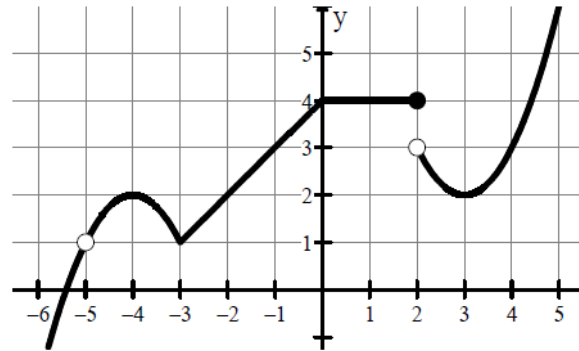


x -values where the function is not continuous.

x -values where the function is continuous, but not differentiable.

Identify any x -values of the function that are not continuous and/or not differentiable.

3.



x -values where the function is not continuous.

x -values where the function is continuous, but not differentiable.

4. f is continuous for $a \leq x \leq b$ but not differentiable for some c such that $a < c < b$. Which of the following could be true?

- (A) $x = c$ is a vertical asymptote of the graph of f . (B) $\lim_{x \rightarrow c} f(x) \neq f(c)$ (C) The graph of f has a cusp at $x = c$.
- (D) $f(c)$ is undefined. (E) None of the above
-

5. If g is differentiable at $x = c$, which of the following must be true?

I. g is continuous at $x = c$.

II. $\lim_{x \rightarrow c} g(x)$ exists.

III. $\lim_{x \rightarrow c} \frac{g(x) - g(c)}{x - c}$ exists.

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) I, II, and III

6. Let h be the function given by $h(x) = |x - 4|$. Which of the following statements about h are true?
- I. h is continuous at $x = 4$.
 - II. h is differentiable at $x = 4$.
 - III. h has an absolute minimum at $x = 4$.

(A) I only

(B) II only

(C) III only

(D) I and III only

(E) II and III only

7. If f is a differentiable function such that $f(2) = 5$ and $f'(2) = 7$, which of the following statements could be false?

- (A) $\lim_{x \rightarrow 2} f(x) = 5$ (B) $\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^+} f(x)$ (C) $\lim_{x \rightarrow 2} \frac{f(x) - 5}{x - 2} = 7$
- (D) $\lim_{h \rightarrow 0} \frac{f(2+h) - 5}{h} = 7$ (E) $\lim_{h \rightarrow 0} f'(x) = 7$
-