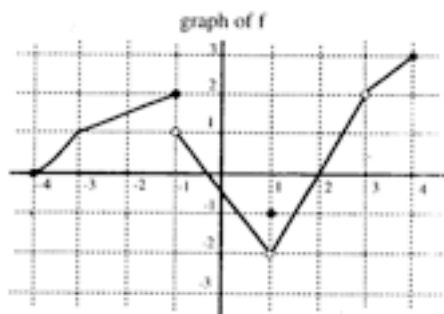


1. The function f is defined on the interval $x \in (-4, 4)$ and has the graph shown below.



For which of the following values is f not differentiable?

- (a) -1 only (b) -1 and 1 only (c) -1, 1, and 3 only
(d) -4 only (e) -4, -1, 1, and 3

2. The end behavior of $g(x) = \sqrt{\frac{x^2 - 4x}{x^2 + 9}}$

- (a) Up on both ends
(b) $y = 1$ on the left and none on the right
(c) None on the left and $y = 1$ on the right
(d) None on the left and up on the right
(e) $y = 1$ on both ends

3. Let m and b be real numbers and let the function f be defined by

$$f(x) = \begin{cases} 3x^2 + mx + 5 & \text{for } x \leq 1 \\ mx + b & \text{for } x > 1 \end{cases}$$

If f is both continuous and differentiable at $x = 1$, then

- (a) $m = 5, b = 8$
 - (b) $m = 5, b = -8$
 - (c) $m = -5, b = 8$
 - (d) $m = -8, b = -5$
 - (e) None of these
-

4. Let $f(x) = \begin{cases} -x + 5, & \text{if } x < -2 \\ x^2 + 1, & \text{if } -2 \leq x \leq 1 \\ 2x^3, & \text{if } 1 < x \end{cases}$. Which of the following statements is true about f ?

- I. f is continuous at $x = 1$.
- II. f is differentiable at $x = 1$.
- III. f has a local minimum at $x = -2$.

- (a) I only
 - (b) II only
 - (c) III only
 - (d) I and III only
 - (e) II and III only
-

5. If the derivative of the function f is $f'(x) = -3(x+2)(x+1)^2(x-3)^3$, then f has a local maximum at $x =$

- (a) -2 only (b) -1 only (c) 3 only (d) -2 and 3 (e) -1 and 3
-

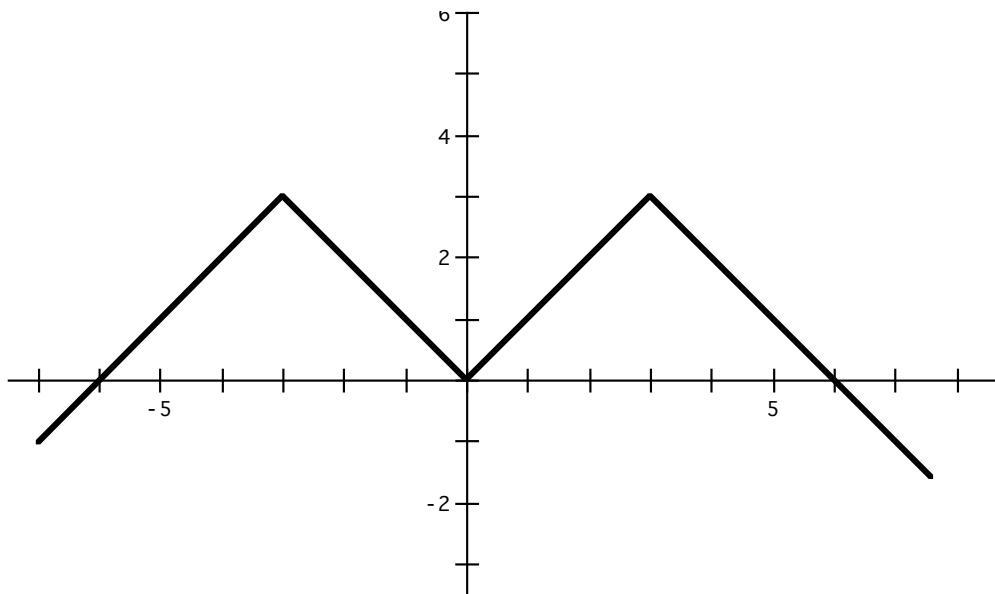
6. Let f be defined by $f(x) = \begin{cases} 5x^2 + 10, & \text{if } x < -2 \\ 30, & \text{if } x = -2 \\ Ax + 10, & \text{if } -2 < x \end{cases}$. Determine the value of A

for which f is continuous for all real x .

- (a) -6 (b) -2 (c) -1 (d) -10 (e) None of these
-

7. The function f is continuous at the point $(c, f(c))$. Which of the following statements could be false?

- (a) $\lim_{x \rightarrow c} f(x)$ exists
(b) $\lim_{x \rightarrow c} f(x) = f(c)$
(c) $\lim_{x \rightarrow c^-} f(x) = \lim_{x \rightarrow c^+} f(x)$
(d) $f'(c)$ exists
(e) None of these
-



8. The graph of the even function f (shown above) consists of four line segments. Which of the following statements about f is false?

- (a) $\lim_{x \rightarrow 0} f(x) - f(0) = 0$ (b) $\lim_{x \rightarrow 0} \frac{f(x) - f(0)}{x} = 0$ (c) $\lim_{x \rightarrow 0} \frac{f(x) - f(-x)}{2x} = \text{dne}$
- (d) $\lim_{x \rightarrow 2} \frac{f(x) - f(2)}{x - 2} = 1$ (e) $\lim_{x \rightarrow 3} \frac{f(x) - f(3)}{x - 3} = \text{dne}$
-

Honors PreCalculus '15-16
Piece Wise Defined Functions
Dr. Quattrin
Calculator allowed

Name: _____

$$1. \quad h(x) = \begin{cases} \frac{x^2 - 4}{x^2 - 9}, & \text{if } x \leq -2 \\ \sqrt{4 - x^2}, & \text{if } -2 < x < 2 \\ 3, & \text{if } x = 2 \\ x, & \text{if } 2 < x \leq 4 \end{cases}$$

i) Is $h(x)$ continuous at $x = -2$? Why or why not?

ii) Is it differentiable at $x = -2$? Why or why not?

$$2. h(x) = \begin{cases} \frac{x^2-4}{x^2-9}, & \text{if } x \leq -2 \\ \sqrt{4-x^2}, & \text{if } -2 < x < 2 \\ 3, & \text{if } x = 2 \\ x, & \text{if } 2 < x \leq 4 \end{cases}$$

i) Is $h(x)$ continuous at $x=2$? Why or why not?

ii) Is it differentiable at $x=2$? Why or why not?

3. Sketch $h(x) = \begin{cases} \frac{x^2-4}{x^2-9}, & \text{if } x \leq -2 \\ \sqrt{4-x^2}, & \text{if } -2 < x < 2 \\ 3, & \text{if } x = 2 \\ x, & \text{if } 2 < x \leq 4 \end{cases}$ and state the Traits listed. Provide

proof for the extreme points.

Domain:

Range:

Zeros:

Y-int:

VAs:

EB (Left):

EB (Right):

Continuity:

Differentiability:

Extreme Points: