

Let's See What We Remember!

1. At $x = 3$, the function given by $f(x) = \begin{cases} x^2, & x < 3 \\ 6x - 9, & x \geq 3 \end{cases}$ is

- a. Undefined
- b. Continuous but not differentiable
- c. Differentiable but not continuous
- d. Neither continuous nor differentiable
- e. Both continuous and differentiable

2. For what value of k , if any, is f continuous at $x = 3$? Justify your answer.

$$f(x) = \begin{cases} \frac{2x^2+5x-3}{x^2+4x+3} & \text{for } x < -3 \\ kx + \frac{1}{2} & \text{for } -3 \leq x \leq 0 \\ \frac{2^x}{3^x-1} & \text{for } x > 0 \end{cases}$$

3. Let f be the function given by $f(x) = |x|$. Which of the following statements about f are true?

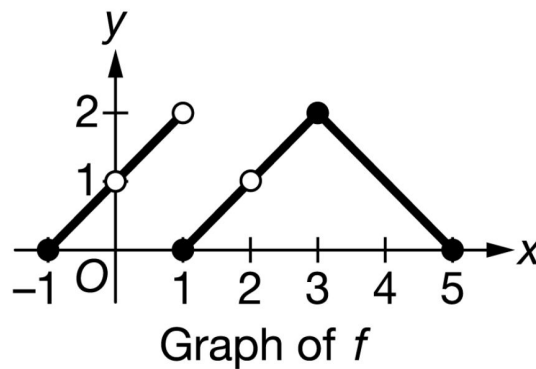
- I. f is continuous at $x=0$.
- II. f is differentiable at $x=0$.
- III. f has an absolute minimum at $x=0$.

- a. I only
- b. II only
- c. III only
- d. I and III
- e. II and III

4. The function f has the properties indicated in the table below. Which of the following must be true.

a	$\lim_{x \rightarrow a^-} f(x)$	$\lim_{x \rightarrow a^+} f(x)$	$f(a)$
-1	4	6	4
0	-3	-3	5
1	2	2	2

- f is continuous at $x = -1$
 - f is continuous at $x = 0$
 - f is continuous at $x = 1$
 - f is differentiable at $x = 0$
 - f is differentiable at $x = 1$
5. The graph of the function f is shown below. What are all values of x for which f has a removable discontinuity?



- 0 only
 - 1 only
 - 0 and 2 only
 - 0, 1, and 2 only
6. Let f be the function defined by $f(x) = \frac{x^4 - 4x^2}{x^2 - 4x}$. Which of the following statements are true?
- f has a discontinuity due to a vertical asymptote at $x = 0$ and $x = 4$.
 - f has a removable discontinuity at $x = 0$ and a jump discontinuity at $x = 4$.
 - f has a removable discontinuity at $x = 0$ and a discontinuity due to a vertical asymptote at $x = 4$.
 - f is continuous at $x = 0$, and f has a discontinuity due to a vertical asymptote at $x = 4$.

7. A student attempted to confirm that the function f defined by $f(x) = \frac{x^2+x-6}{x^2-7x+10}$ is continuous at $x = 2$. In which step, if any does an error first appear?

$$\text{Step 1: } f(x) = \frac{x^2+x-6}{x^2-7x+10} = \frac{(x-2)(x+3)}{(x-2)(x-5)}$$

$$\text{Step 2: } \lim_{x \rightarrow 2} f(x) = \lim_{x \rightarrow 2} \frac{x+3}{x-5} = \frac{2+3}{2-5} = -\frac{5}{3}$$

$$\text{Step 3: } f(2) = \frac{2+3}{2-5} = -\frac{5}{3}$$

$$\text{Step 4: } \lim_{x \rightarrow 2} f(x) = f(2), \text{ so } f \text{ is continuous at } x = 2.$$

- a. Step 2
- b. Step 3
- c. Step 4
- d. There is no error