

(a) If $f(x) = 2x + 1$, when $x \neq 1$ and $f(x) = 3$ when $x = 1$, show that the function $f(x)$ is continuous at $x = 1$.

(b) If $f(x) = \begin{cases} 4x + 3, & x \neq 2 \\ 3x + 5, & x = 2 \end{cases}$, find whether the function f is continuous at $x = 2$.

(c) Determine whether $f(x)$ is continuous at $x = 2$, where

$$f(x) = \begin{cases} 4x + 3, & x \leq 2 \\ 8 - x, & x > 2 \end{cases}$$

(d) Examine the continuity of $f(x)$ at $x = 1$, where

$$f(x) = \begin{cases} x^2, & x \leq 1 \\ x + 5, & x > 1 \end{cases}$$

(e) Determine the values of k so that the function

$$f(x) = \begin{cases} kx^2, & x \leq 2 \\ 3, & x > 2 \end{cases} \text{ is continuous at } x = 2.$$

1. Examine the continuity of the following functions :

(a) $f(x) = |x - 2|$ at $x = 2$ (b) $f(x) = |x + 5|$ at $x = -5$

(c) $f(x) = |a - x|$ at $x = a$

$$(d) f(x) = \begin{cases} \frac{|x-2|}{x-2}, & x \neq 2 \\ 1, & x = 2 \end{cases} \quad \text{at } x = 2$$

$$(e) f(x) = \begin{cases} \frac{|x-a|}{x-a}, & x \neq a \\ 1, & x = a \end{cases} \quad \text{at } x = a$$

3. (a) If $f(x) = \begin{cases} \sin 4x, & x \neq 0 \\ 2, & x = 0 \end{cases}$, at $x = 0$

(b) If $f(x) = \begin{cases} \frac{\sin 7x}{x}, & x \neq 0 \\ 7, & x = 0 \end{cases}$, at $x = 0$

(c) For what value of a is the function

$$f(x) = \begin{cases} \frac{\sin 5x}{3x}, & x \neq 0 \\ a, & x = 0 \end{cases} \quad \text{continuous at } x = 0?$$

4. (a) Show that the function $f(x)$ is continuous at $x = 2$, where

$$f(x) = \begin{cases} \frac{x^2 - x - 2}{x - 2}, & \text{for } x \neq 2 \\ 3, & \text{for } x = 2 \end{cases}$$

(b) Test the continuity of the function $f(x)$ at $x = 1$, where

$$f(x) = \begin{cases} \frac{x^2 - 4x + 3}{x - 1} & \text{for } x \neq 1 \\ -2 & \text{for } x = 1 \end{cases}$$

(c) For what value of k is the following function continuous at $x = 1$?

$$f(x) = \begin{cases} \frac{x^2 - 1}{x - 1} & \text{when } x \neq 1 \\ k & \text{when } x = 1 \end{cases}$$

(d) Discuss the continuity of the function $f(x)$ at $x = 2$, when

$$f(x) = \begin{cases} \frac{x^2 - 4}{x - 2}, & \text{for } x \neq 2 \\ 7, & x = 2 \end{cases}$$

5. (a) If $f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$, find whether f is continuous at $x = 0$.