

TOPIC: CONTINUITY

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Q. 1 Show that $f(x) = f(x) = \begin{cases} 5x - 4, & \text{when } 0 < x \leq 1 \\ 4x^3 - 3x, & \text{when } 1 < x < 2 \end{cases}$

is continuous at $x = 1$

Q. 2 Find all points of discontinuity of f , where f is defined as follows:

$$f(x) = \begin{cases} |x| + 3, & x \leq -3 \\ -2x, & -3 < x < 3 \\ 6x + 2, & x \geq 3 \end{cases}$$

Q. 3 Show that the function $f(x)$ defined by

$$f(x) = \begin{cases} kx + 1, & \text{if } x \leq \pi \\ 2, & x = 0 \\ \frac{4(1 - \sqrt{1 - x})}{x}, & x < 0 \end{cases}$$

is continuous at $x = 0$

Q. 4 Find the relationship between a and b , so that the function f defined by

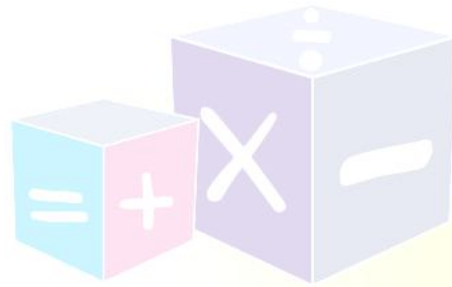
$$f(x) = \begin{cases} ax + 1, & \text{if } x \leq 3 \\ bx + 3, & \text{if } x > 3 \end{cases}$$

Is continuous at $x = 3$

Q. 5 Find the value of k , so that the function f defined by

$$f(x) = \begin{cases} kx + 1, & \text{if } x \leq \pi \\ \cos x, & \text{if } x > \pi \end{cases}$$

Is continuous at $x = \pi$



Q. 6 For what value of λ is the function

$$f(x) = \begin{cases} \lambda(x^2 - 2x), & \text{if } x \leq 0 \\ 4x + 1, & \text{if } x > 0 \end{cases}$$

is continuous at $x = 0$?

Q. 7 Find the value of k , so that the function f defined by

$$f(x) = \begin{cases} \frac{k \cos x}{\pi - 2x}, & \text{if } x \neq \frac{\pi}{2} \\ 3, & \text{if } x = \frac{\pi}{2} \end{cases}$$

is continuous at $x = \frac{\pi}{2}$

Q. 8 Find the value of a for which the function defined as

$$f(x) = \begin{cases} a \sin \frac{\pi}{2}(x+1), & x < 0 \\ \frac{\tan x - \sin x}{x^3}, & x > 0 \end{cases}$$

is continuous at $x = 0$

Q. 9 If the function $f(x)$ is given by

$$f(x) = \begin{cases} 3a + b, & \text{if } x > 1 \\ 11, & \text{if } x = 1 \\ 5ax - 2b, & \text{if } x < 1 \end{cases}$$

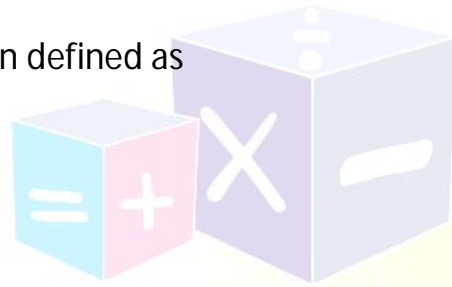
is continuous at $x = 1$, then find the values of a and b .

Q. 10 Find the value of a , if the function $f(x)$ defined by

$$f(x) = \begin{cases} 2x - 1, & x < 2 \\ a, & x = 2 \\ x + 1, & x > 2 \end{cases}$$

is continuous at $x = 2$

Q. 11 Find the values of a and b such that the function defined as follows is continuous



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$$f(x) = \begin{cases} x+2, & x \leq 2 \\ ax + b, & 2 < x < 5 \\ 3x-2, & x \geq 5 \end{cases}$$

Q. 12 For what value of k, is the function defined by

$$f(x) = \begin{cases} k(x^2 + 2), & \text{if } x \leq 0 \\ 3x+1, & \text{if } x > 0 \end{cases}$$

Continuous at $x = 0$? Also, write whether the function is continuous at $x = 1$.

Q. 13 For what value of k, is the following function continuous at $x = 2$?

$$f(x) = \begin{cases} 2x+1, & x < 2 \\ k, & x = 2 \\ 3x-1, & x > 2 \end{cases}$$

Q. 14 If $f(x)$ defined by the following, is continuous at $x = 0$, then find the values of a, b and c.

$$f(x) = \begin{cases} \frac{\sin(a+1)x + \sin x}{x}, & \text{if } x < 0 \\ c, & \text{if } x = 0 \\ \frac{\sqrt{x+bx^2} - \sqrt{x}}{bx^{3/2}}, & \text{if } x > 0 \end{cases}$$

Q. 15 If the following function $f(x)$ is continuous at $x = 0$, then find the value of k

$$f(x) = \begin{cases} \frac{1 - \cos 2x}{2x^2}, & x \neq 0 \\ k, & x = 0 \end{cases}$$

Q. 16 Discuss the continuity of the function $f(x)$ at $x = \frac{1}{2}$, when $f(x)$ is defined as follows;

$$f(x) = \begin{cases} 1/2+x, & 0 \leq x < 1/2 \\ 1, & x = 1/2 \\ 3/2+x, & 1/2 < x \leq 1 \end{cases}$$

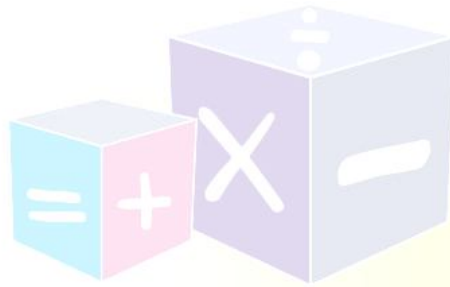
Q. 17 Find the values of a and b such that the following function $f(x)$ is a continuous function

$$f(x) = \begin{cases} 5, & x \leq 2 \\ ax+b, & 2 < x < 10 \\ 21, & x \geq 10 \end{cases}$$

Q. 18 Find the value of k, so that the function f defined below, is continuous at $x = 0$, where

$$f(x) = \begin{cases} \left(\frac{1 - \cos 4x}{8x^2} \right), & \text{if } x \neq 0 \\ k, & \text{if } x = 0 \end{cases}$$

Q. 19 If $f(x) = \begin{cases} \frac{1 - \cos 4x}{x^2}, & \text{when } x < 0 \\ a, & \text{When } x = 0 \\ \frac{\sqrt{x}}{\sqrt{16 + \sqrt{x}} - 4}, & \text{when } x > 0 \end{cases}$



And f is continuous at $x = 0$, then find the value of a.

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Q. 20 Find the value of k, for which

$$f(x) = \begin{cases} \frac{\sqrt{1+kx} - \sqrt{1-kx}}{x}, & \text{if } -1 \leq x < 0 \\ \frac{2x+1}{x-1}, & \text{if } 0 \leq x < 1 \end{cases}$$

is continuous at $x = 0$
