

Continuity

Fun 4
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- ① Find the values of p and q for which

$$f(x) = \begin{cases} \frac{1 - \sin^2 x}{3 \cos^2 x}, & \text{if } x < \frac{\pi}{2} \\ p, & \text{if } x = \frac{\pi}{2} \\ \frac{q(1 - \sin x)}{(\pi - 2x)^2}, & \text{if } x > \frac{\pi}{2} \end{cases}$$

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

- ② Find the value of the constant k so that the function $f(x)$ defined below is continuous at $x = 0$, where

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

- ③ Let $f(x) = \begin{cases} \frac{1 - \cos 4x}{x^2}, & \text{if } x < 0 \\ a, & \text{if } x = 0 \\ \frac{\sqrt{x}}{(\sqrt{16 + \sqrt{x}} - 4)}, & \text{if } x > 0 \end{cases}$

If $f(x)$ is continuous at $x=0$, determine the value of a .

$$(4) \quad \text{If } f(x) = \begin{cases} 1, & \text{if } x \leq 3 \\ ax+b, & \text{if } 3 < x < 5 \\ 7, & \text{if } x \geq 5 \end{cases}$$

Find a and b so that $f(x)$ is a continuous function.

(5) 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 $x=0$.

$$(6) \quad \text{If } f(x) = \begin{cases} \frac{x^3 + x^2 - 16x + 20}{(x-2)^2}; & x \neq 2 \\ k; & x = 2 \end{cases}$$

Find the value of k , so that the function is continuous at $x=2$.