

MA1 Homework 9

1. Find a value for the constant k , if possible, that will make the function continuous.

$$(a) f(x) = \begin{cases} 7x - 2 & x \leq 1 \\ kx^2 & x > 1 \end{cases}$$

$$(b) f(x) = \begin{cases} kx^2 & x \leq 2 \\ 2x + k & x > 2 \end{cases}$$

2. On which of the following intervals is $f(x) = \frac{1}{\sqrt{x-2}}$ continuous? **Justify your answer.**

(a) $[2, +\infty)$

(b) $(-\infty, +\infty)$

(c) $(2, +\infty)$

(d) $[1, 2)$

3. Check the following function for continuity at $x = 3$ and at $x = -3$.

$$f(x) = \begin{cases} \frac{x^3 - 27}{x^2 - 9} & x \neq 3 \\ \frac{9}{2} & x = 3 \end{cases}$$

4. Find the points of discontinuity and determine whether the discontinuities are removable.

(a) $f(x) = \frac{x^2 - 4}{x^3 - 8}$

(b) $f(x) = \begin{cases} 2x - 3 & x \leq 2 \\ x^2 & x > 2 \end{cases}$

(c) $f(x) = \begin{cases} 3x^2 + 5 & x \neq 1 \\ 6 & x = 1 \end{cases}$

5. Find each limit.

(a) $\lim_{x \rightarrow -\infty} \frac{\sqrt{9x^6 - x}}{x^3 + 1}$

(b) $\lim_{x \rightarrow -\infty} \frac{x}{\sqrt[4]{x^4 + 1}}$