

Question 8

Sketch the graph of the piecewise function:

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

Instructions: Clearly indicate open and closed points on the graph. Identify points of discontinuity, if any.

Question 8 - Solution

We are given a piecewise function:

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

Step 1: Evaluate endpoints to check continuity.

From the left of $x = -1$, $\lim_{x \rightarrow -1^-} f(x) = -1 + 2 = 1$

At $x = -1$, $f(-1) = (-1)^2 = 1 \Rightarrow$ continuous

From the right of $x = 2$, $\lim_{x \rightarrow 2^+} f(x) = 4 - 2 = 2$

At $x = 2$, $f(2) = 2^2 = 4 \Rightarrow$ discontinuous at $x = 2$

Discontinuity: Jump discontinuity at $x = 2$

