

Math 249 - L02

Worksheet 4(Continuity)(Answers)

1. Determine whether or not the function given in each case is continuous at the given point. Give reasons for your answer.

a.
$$f(x) = \begin{cases} x^3 + x^2 & x \leq -2 \\ 2x^2 - 4 & x > -2 \end{cases} \quad \text{at } x = -2.$$

f is not continuous at $x = -2$ since $\lim_{x \rightarrow -2} f(x)$ does not exist.

b.
$$f(x) = \begin{cases} |x^2 - 4| & -2 \leq x \leq 2 \\ 2x - 4 & x > 2 \\ 3x + 4 & x < -2 \end{cases} \quad \text{at } x = 2 \text{ and at } x = -2.$$

f is continuous at $x = 2$.

f is not continuous at $x = -2$ since $\lim_{x \rightarrow -2} f(x)$ does not exist.

c.
$$f(x) = \begin{cases} \frac{x^3 - 9x}{x^2 + x - 12} & x > 3 \\ \frac{10}{7} & x = 3 \\ \frac{2x^2}{7} & x < 3 \end{cases} \quad \text{at } x = 3.$$

f is not continuous at $x = 3$ since $\lim_{x \rightarrow 3} f(x) \neq f(3)$

d.
$$f(x) = \begin{cases} x + \frac{1}{x} & x < 0 \\ -x^3 & x \geq 0 \end{cases} \quad \text{at } x = 0.$$

f is not continuous at $x = 0$ since $\lim_{x \rightarrow 0} f(x)$ does not exist.

Math 249 – L02

Worksheet 4(Continuity)(Answers)

$$e. \quad f(x) = \begin{cases} x + \frac{1}{x} & x < 0 \\ -2 & x = 0 \\ -\frac{1}{x^3} & x > 0 \end{cases} \quad \text{at } x = 0.$$

f is not continuous at $x = 0$.

2. In each case determine values of a so that the function given is continuous.

$$a. \quad f(x) = \begin{cases} 3x^3 - 4x^2 + a & x \leq -2 \\ 4x^2 - 1 & x > -2 \end{cases}$$

For f to be continuous, $a = 55$

$$b. \quad f(x) = \begin{cases} \frac{x^3 + x^2 - ax}{x^2 - 1} & x \leq -2 \\ 2x^2 + 3x - 4 & x > -2 \end{cases}$$

For f to be continuous, $a = -1$