University of Calgary
Faculty of Science
Department of Mathematics and Statistics

Math 249 Fall 2005

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

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

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

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

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

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

d. $f(x) = \begin{cases} x + \dfrac{1}{x} & x < 0 \\ -x^3 & x \ge 0 \end{cases}$ at x = 0.

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

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e. $$f(x) = \begin{cases} x + \dfrac{1}{x} & x < 0 \\ -2 & x = 0 \\ -\dfrac{1}{x^3} & x > 0 \end{cases}$$ 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. $$f(x) = \begin{cases} 3x^3 - 4x^2 + a & x \le -2 \\ 4x^2 - 1 & x > -2 \end{cases}$$

For f to be continuous, a = 55

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

For f to be continuous, a = -1