Math 17A
Kouba
Worksheet 1

1.) Use the three-step definition of continuity for each of the following problems.

a.) Let $f(x) = \begin{cases} x^2+3 & \text{if } x \neq -1 \\ 2 & \text{if } x = -1. \end{cases}$ Determine if f is continuous at $x = -1$.

b.) Let $g(x) = \begin{cases} x+1 & \text{if } x \geq 0 \\ 2-x^2 & \text{if } x < 0. \end{cases}$ Determine if g is continuous at $x = 0$.

c.) Let $f(x) = \begin{cases} x-2 & \text{if } x > 1 \\ 0 & \text{if } x = 1 \\ -x & \text{if } x < 1. \end{cases}$ Determine if f is continuous at $x = 1$.

2.) Use approved shortcuts and facts from class to determine (with a brief explanation) the x-values for which each of the following functions is continuous.

a.) $f(x) = x^5 + x^4 + x^3 + x^2 + x + 1$ b.) $g(x) = \dfrac{\sin x}{x^2+4}$

c.) $f(x) = \dfrac{x+3}{x^2-4}$ d.) $g(x) = \cos(x^3 - x)$

3.) Determine constants A and B so that each of the following functions is continuous for all values of x. Start by drawing a"fake" graph. Then use limits.

a.) $f(x) = \begin{cases} \dfrac{x^2-7x+6}{x-6} & \text{if } x \neq 6 \\ A & \text{if } x = 6. \end{cases}$

b.) $f(x) = \begin{cases} A^2x - A & \text{if } x \geq 1 \\ 2 & \text{if } x < 1. \end{cases}$

c.) $f(x) = \begin{cases} \dfrac{A+x}{A+1} & \text{if } x < 0 \\ Ax^3 + 3 & \text{if } x \geq 0 \end{cases}$

d.) $f(x) = \begin{cases} 3 & \text{if } x \leq 1 \\ Ax^2 + B & \text{if } 1 < x \leq 2 \\ 5 & \text{if } x > 2 \end{cases}$

e.) $f(x) = \begin{cases} Ax - B & \text{if } x \leq -1 \\ 2x + 3A + B & \text{if } -1 < x \leq 1 \\ 4 & \text{if } x > 1 \end{cases}$