Math 16A
Kouba
Worksheet 2

1.) Determine the constants a (and b) so that each of the following functions is continuous for all values of x.

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

b.) $f(x) = \begin{cases} a^2 x - a & , \quad x \geq 1 \\ 2 & , \quad x < 1 \end{cases}$

c.) $f(x) = \begin{cases} \dfrac{a + x}{a + 1} & , \quad x < 0 \\ a x^3 + 3 & , \quad x \geq 0 \end{cases}$

d.) $f(x) = \begin{cases} 3 & , \quad x \leq 1 \\ a x^2 + b & , \quad 1 < x \leq 2 \\ 5 & , \quad x > 2 \end{cases}$

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

2. An example of continuity as a measure of fairness-- A small city proposes the following tax scheme for its residents in order to upgrade public parks. The annual income and proposed amount of tax appear in the table below.

a. Sketch a graph of the amount of tax paid as a function of annual income x.

b. In your opinion, is this tax scheme a fair one ? (Use the graph in part a.) Explain.

Annual Income	Tax
\$0 - \$20,000	0.3% of income
\$20,001 - \$40,000	the larger of \$60 and 0.2% of income
\$40,001 - \$60,000	a flat fee of \$20 plus 0.18% of income
\$60,001 and higher	the larger of \$128 and 0.16% of income

An Example of Continuity as Fairness