

Math 16A
Vogler
Worksheet 2

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

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

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

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

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

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

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.

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

