Problem Set #3

1. The federal government is trying to decide how many hours G of new Canadian programming to produce for broadcast on CBC television next year. Surveys have determined that only three people watch the CBC in total, two with demand curves given by

$$G_i = 15 - p_i \quad (i = 1, 2)$$

where p_i is the price the individual pays for each hour of programming; and the third with demand curve

$$G_3 = 100 - p_3.$$

   (a) Calculate the *Pareto efficient* level of new programming G^*, when the marginal cost of an hour of new programming is 100 units of private consumption per hour (that is, the marginal rate of transformation is 100).

   (b) Suppose that the government instead holds a referendum among the three CBC viewers to determine how much new programming will be provided. If each voter expects to pay an equal share (one-third) of the total cost through the tax system, what do you expect will be the *majority voting equilibrium* level $\hat{G}$ of new programming? Explain why G^* and $\hat{G}$ differ, and comment on the use of democratic decision-making procedures in such cases.

2. The 100 residents of Anytown must decide whether to build a new public park or not. The total cost of the park is \$110. Forty residents are Nature-Lovers who would value the services of the new park (before taxes) at \$3, and 60 residents are TV-Addicts who would receive no benefit from the park.

   (a) According to the Samuelson rule, is building the park efficient or not? If it is efficient, show how the government can assign tax shares to residents so that building the park is a Pareto improvement over not building the park. (Your answer should include a clear definition of *Pareto improvement*.

   (b) Now suppose that taxes for the new park would be divided equally among all residents—Nature-Lovers and TV-Addicts—and the decision of whether to build or not is chosen by majority voting. Will a majority of residents vote in favour of the park, or against it? Does your answer suggest that majority voting fails to be efficient in this case or not? Justify your answer.

   (c) Now suppose that the government knows that all residents have one of the two preference types above, but does not how many are Nature-Lovers (it could be any number between 0 and 100, instead of 40), and it cannot tell which resident is of which type. Is it possible to design a tax system (where a resident's taxes may depend on how they vote) so that Nature-Lovers vote in favour of the park and TV-Addicts vote against it, and the park is built if and only if it is efficient to do so. Include mathematical reasoning in your answer if possible, but also give a clear intuition for the tax system you are proposing.

3. In 2006, government spending in Canada equalled almost 41 per cent of Gross Domestic Product, compared to 19 per cent of GDP in 1950. Suggest *three* factors that have contributed to this growth in the size of government. (You may wish to cite the views of Dennis Mueller on "The size of government.") Does your answer suggest that government decisions reflect the preferences of a majority of voters, or other considerations?

4. Consider the Hotelling model of competition between political parties, discussed in the lecture, but suppose that the two parties choose election platforms to maximize their shares of the vote, rather than their probabilities of winning the election. Show that the unique Nash equilibrium again entails both parties converging to the preferred platform of the median voter.

5. There are three mutually exclusive social alternatives (A, B, C) and 11 voters each of whom has preference rankings as follows:

voter type	1	2	3
first choice	A	B	C
second choice	B	A	A
third choice	C	C	B
number of voters	2	5	4

(a) Define the *Borda Count* procedure for choosing a winner. Which alternative wins under the Borda Count? Would any voter have an incentive to vote strategically under Borda Count in this example?

(b) Define the *Alternative Vote* procedure for choosing a winner. Which alternative wins under the Alternative Vote? Would any voter have an incentive to vote strategically under Alternative Vote in this example?