Economics C44 : Urban Economics

There are two sections to the exam. Part A has seven questions. Answer five questions in Part A. Part B has five questions. Answer three questions in Part B. Each part has equal weight. You have two hours to complete the exam.

Part A -- Answer 5 of 7

1. Summarise the key ways in which the US tax system treats rental housing differently from owner occupied housing.
2. Discuss the following statement. "Public transport is the most efficient transportation system and public rail transport is the most efficient form of public transport."
3. Suppose a £5 a day road tax for road use during peak hours is imposed. Under what conditions would this be efficiency improving? Suppose it was efficiency improving, why might people oppose it?
4. Lakefront land adjacent to the centre of Chicago is worth $1 million per acre. The city proposes to fill in part of the lake to create more land to sell. The cost of filling and grading is only $200,000 per acre for the newly created land, leaving the city with a net profit of $800,000. Would you recommend this policy? Why?
5. Why do breweries typically locate near their markets (far from their input sources) while wineries typically locate near their input sources (far from their markets)?
6. Consider a small town that is split politically into three local jurisdictions. The government of each jurisdiction provides fire fighting services for its citizens only, even though fires sometimes spread across administrative boundaries. Within each jurisdiction all citizens benefit, not necessarily equally, from expenditures on fire fighting services. Suppose that the three local jurisdictions consolidate and their governments form a single government. Will the new arrangement be more or less efficient than the original? From a social welfare perspective, which is better the original or the final arrangement?
7. If the social costs of burglaries in a city are *C(B)* where *B* is the number of burglaries and the number of burglaries (everything else held constant) is determined by public resources *R* spent on burglary prevention through the function *B(R)*, what condition describes the optimum amount of resources a city should spend preventing burglaries? Assume $\frac{dC}{dB} > 0$ and $\frac{dB}{dR} < 0$. Should it reduce the number of burglaries to zero? Why or why not? If everything else is not held constant, what other factors influence the number of burglaries?

Part B –- Answer 3 of 5

1) Consider a city in which there is an airport and a large number of residents. The airport is ugly and produces noise and other pollution. Do land-use restrictions that restrict the size of the airport and the number of flights at the airport contribute to economic efficiency? Why? What are the economic problems that such land-use restrictions seek to address? What alternative policies could be used to combat the problems? What are the benefits and costs of these alternative policies?

2) In a circular city, all consumers commute to the centre. Transportation costs for a consumer living at distance *u* are *t*u*. All consumers have identical incomes *I* and identical preferences over consumption of x_1 (bread) and x_2 (land). p_1 the price of x_1 is the same everywhere in the city while *R(u)* the price of x_2 varies depending on distance from the centre. Let the utility function be $U(x_1, x_2) = \left(ax_1^{\sigma} + x_2^{\sigma}\right)^{\frac{1}{\sigma}}$.
   a) What are the first-order conditions characterising the consumers' optimal choices?
   b) For fixed location *u*, solve for the optimal choices of x_1 and x_2 as functions of *u* and the other variables.
   c) Solve for the differential equation describing the slope of the equilibrium land rent function.
   d) In a full equilibrium of this city, how is the radius of the city determined?

3) Lake George can be freely accessed by fishermen. Fishermen maximise profits and earn nothing if they don't fish. The cost of sending a boat out on the lake is £1.5 per boat. When *b* boats are sent out on the lake, $f(b) = 100 - \frac{1}{100}(b-100)^2$ fish are caught in total (each boat catches $f(b)/b$ fish). The price of the fish is £1 per fish and is unaffected by the number of fish caught. Fractional numbers of boats are feasible.
   a) What is the equilibrium number of boats sent out on the lake?
   b) What is the optimal number of boats sent out on the lake?
   c) What per boat fishing tax would result in an efficient equilibrium outcome?
   d) Suggest an alternative policy (other than the tax) that would lead to the efficient outcome.

4) A government is worried about poverty and housing. Poor people have incomes $I = 2$ and spend money on two commodities, housing H and alcohol A. Utility is $U(H,A) = H^{0.5}A^{0.5}$, the price of housing is $p_H = 1$, the price of alcohol is $p_A = 1$.
   a) If there are no subsidies on housing and no income transfers, what is the poor household's optimal consumption of housing and alcohol? What is their level of utility?
   b) Suppose the government offers a housing subsidy, offering to pay half of the housing expenditures of the poor. What is the new optimal choice of housing, alcohol, and level of utility of the poor?
   c) What is the cost of the subsidy program?
   d) Let t_0 equal the cost calculated in c). Suppose instead of the subsidy program in c) the government gave each poor household t_0. What is the poor household's optimal choice of housing, alcohol, and utility level in this case?
   e) Under these assumptions, why does the second policy yield higher utility for the poor?
   f) Why might a government prefer the first policy even though the poor prefer the second policy under the assumptions stated?

5) Suppose there is a small city in which every individual has income I_1. Each also has identical preferences over the two commodities, food and land. Suppose further everyone commutes to the centre at cost $t(I_1,u)$ where for each person u is the distance from their residence to the centre. All land in the city is used for consumption. The city is in spatial equilibrium with population N_1 and boundary rent R_F. After a long period of population stability with population N_1, barriers to entry change and N_2 people each with income $I_2 < I_1$ flood into the city. The new immigrants have the same preferences as the initial residents and have transportation costs $t(I_2,u)$. What happens to rents, the size of the city, utility levels, and the consumption of non-land goods? Where in the city will the new immigrants end up?