UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For the following qualifications :-

B.A.   B.Sc.(Econ)

Economics C44: Urban Economics

COURSE CODE	:	**ECONC044**
UNIT VALUE	:	**0.50**
DATE	:	**13-MAY-02**
TIME	:	**14.30**
TIME ALLOWED	:	**2 hours**

TURN OVER

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

Part A

1. You are about to move and are choosing between two communities, Hyde Park and Harlem[1]. The communities appear to have different crime rates. Hyde Park had 10 muggings per month per 100,000 residents last year while Harlem had 20 muggings per month per 100,000 residents last year. In which community is the probability of being mugged during an evening stroll higher? Why?

2. Imagine a circular city with a large number of identical residents who consume food and land. All residents incur costs to commute to the centre. Transportation costs are increasing with distance to the centre. Why do equilibrium land rents fall with distance from the centre? Why is the rate at which they fall higher near the centre of the city?

3. Imagine a city identical to that in question 2 but with two types of residents. Suppose these two types of people have bid rent functions as depicted in the following figure.


Type 1 Bid Rent

Type 2 Bid Rent
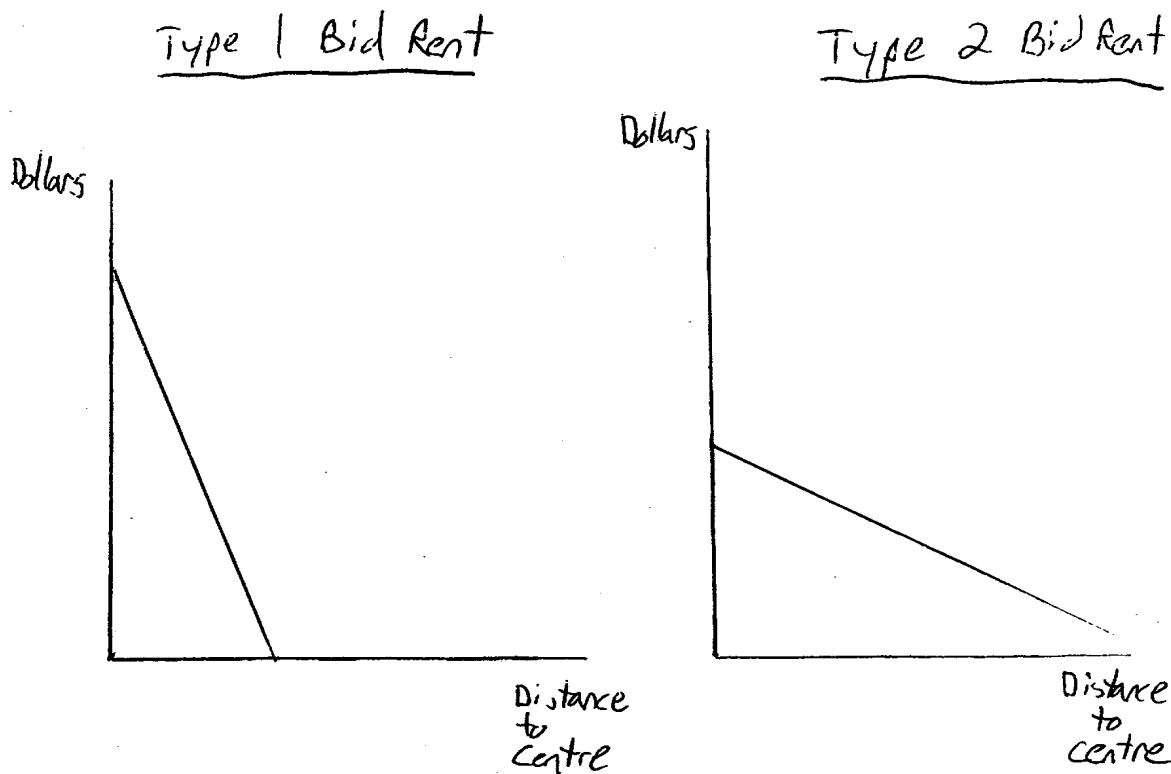
Draw a figure depicting the equilibrium location choices in this two sector city and explain who lives closer to the centre and why. Explain how the width of the two sectors is determined and how the rent at the boundaries is determined.

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[1] The communities listed in this question are fictitious. Any resemblance to real places is coincidental.

TURN OVER

4. Some public museums are free but suffer from congestion. Why is this economically inefficient? Show on a graph what the efficient entrance fee would be. Why might it be a good idea to charge an inefficient price?

5. Which industries would you expect to concentrate in big urban areas? Why? What are the economic characteristics that distinguish these from industries that concentrate in rural areas?

6. Suppose the interest rate is 5% a year and you can borrow and lend as much as you want at that interest rate. Is it better to pay £100 per year forever for a flat or pay £3,000 right now? What if there is 2% inflation?

7. Why do property owners abandon buildings?

8. Explain how a second price auction can be used to determine the best location for an airport or other undesirable public facility. Explain how the auction mechanism gives local communities incentives to truthfully reveal the harm that will be inflicted on them by the undesirable facility.

CONTINUED

Part B

1. Suppose the aggregate marginal benefits and costs of land use controls in a city are as depicted in the following picture. The x-axis measures the stringency of the controls. The minimum level of restriction is zero and the maximum is one. The marginal benefits to residents fall as land use controls become more stringent. The marginal costs to owners of unoccupied land (developers) rise as controls become more stringent. Land use restrictions are chosen by majority rule.

   a. Why are marginal benefits accruing to residents positive and declining?

   b. Why are marginal costs inflicted on developers positive and rising?

   c. If there are 100 residents in the town and 10 owners of undeveloped land what is the equilibrium level of land use restriction?

   d. What is the efficient level of land use restriction? Why?

   e. How much would the owners of undeveloped land be willing to pay to reduce the level of restriction to the efficient level?

   f. How much money would the residents require to be willing to accept this change?

   g. What are some reasons why the residents and the developers might not be able to reach an agreement to attain the efficient level of land use restriction?

Aggregate Marginal Benefits

Aggregate Marginal Costs

Stringency of Controls
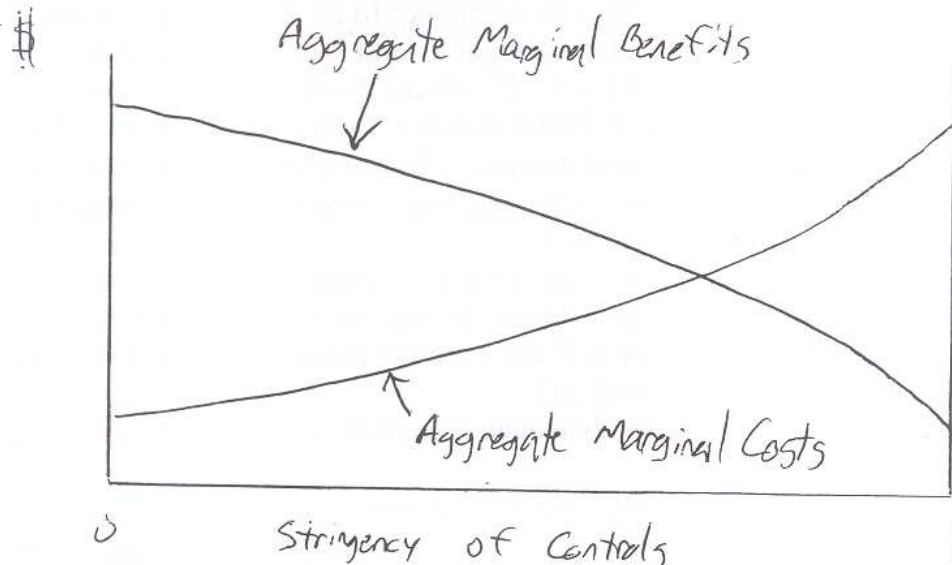
2. There are two ways to get from San Francisco to Stanford. By car on route 280 or by train. Suppose the travel costs for each consumer on the freeway are $C = 5 + 10N$ where N (measured in thousands) is the equilibrium number of people who use the freeway. Further suppose that the cost of the train differs across people because different people live at different distances from the train station. Each person in the city travels by car if and only if his or her personal travel cost by train is higher than the travel cost on the road. Travel costs by train range from 0 to 100. There are a total of N_0 people in the city $N_0 = 20$ (denominated in thousands). Travel costs are distributed uniformly. That is C percent of the population have travel costs less than C for every C.

   a. If travel costs on the road were C_E how many people N would choose to drive?

   b. Calculate the equilibrium number of people on the freeway, N_E, the equilibrium cost per person on the freeway, C_E, the total social costs of travelling on the freeway and the total costs of those remaining who travel on the train.

c. How many people should travel on the freeway to minimize total costs of travel? What are the total travel costs if the optimal number of people travel by freeway?

3. Suppose there are two types of people, those with high wages w_1 £ per hour and those with low wages w_2 £ per hour. $w_2 < w_1$. Utility is $U(F,L)$ and everyone commutes to the centre. If a person lives u miles from the centre, it takes tu hours to commute to the centre. The price of food is p_F and the price of a unit of land is $R(u)$. Each person has 8 hours to allocate to work and commuting and all income is from work.
   a. What is the consumer budget constraint?
   b. Who lives closer to the centre of the city? Why?
   c. Who spends more time commuting?
   d. How do the answers change if there are two modes of transport, one that charges a fare of p_1 £ per trip and requires t_1 hours per mile and a second that charges a fare of p_2 £ per trip and requires t_2 hours per mile? ($p_1 < p_2$ and $t_1 > t_2$)

4. Imagine a city that is a circle. The central business district is located at a point at the centre and every worker in the city commutes to the centre. The city has a fixed population N and the rent for agricultural land is R_F. The residents have identical utility functions $U(F,L) = F^{0.5}L^{0.5}$ where F is the amount of food consumed and L is the amount of land consumed. Each consumer has income I and pays p_F £ for each kilo of food and $R(u)$ £ for each unit of land if they live at distance u from the centre. Also, each consumer living at distance u from the centre pays tu £ in transportation costs.
   a. Show the optimal choices of F and L for a consumer living at u.
   b. What is the equation that characterizes the equilibrium rent function?
   c. Solve for the optimal choice of F and L for the consumer living at distance u. What do these choices depend on?
   d. What is the total demand for land at each location u? What is the supply of land at location u?
   e. What is the population living at each location u?
   f. What are the two equations in two unknowns that characterize equilibrium in this economy?
   g. Suppose N increases in the previous problem. What will happen to the rent function, the width of the city, the demand for land, and the demand for food?

5. Suppose a homeowner owns a house of value V. The interest rate is i, the homeowner pays a property tax equal to $T\%$ of the value, maintenance costs are $C\%$ of the value and the property value appreciates at $g\%$ per year.
   a. What is the formula relating the value of the house to the user cost of the house?
   b. Suppose interest costs and property tax costs are deductible from the user's income tax, what is the new formula?
   c. What if in addition there is inflation of $\pi\%$ per year? What is the new formula?
   d. Suppose a house costs £100,000. Inflation is 5%, the mortgage rate is 7%, and property taxes are 2%. Depreciation and maintenance are 1% each. There are

no expected capital gains. What rent must the owner of this house charge to cover expenses?

e. If inflation remains at 5% and the mortgage rate rises to 9%, what changes would you expect in rent or house value?

6. There are two modes of transportation, automobile and tube. Suppose utility for individual i if they commute using mode j is

$$ U_{ij} = \left(\beta_1 + \beta_2 w_i\right)t_{ij} + \beta_3 p_{ij} + \varepsilon_{ij} $$

where w_i is the wage of person i measured in £ per hour, t_{ij} is the commuting time measured in hours per trip for person i using mode j, and ε_{ij} is a variable that measures other factors that influence person i's utility if they choose mode j.

a. Would you expect β_1, β_2, and β_3 to be positive or negative? Why?
b. What other factors might be subsumed in ε_{ij}?
c. How might you obtain estimates of β_1, β_2, and β_3?
d. Suppose you obtain estimated of β_1, β_2, and β_3. How much would a person with wages w be willing to pay for a new tube line that cut their total travel time from 1 hour to 30 minutes? Assume everything about the new tube line that affects utility except price and time remains unchanged.

END OF PAPER