Economics 780
November 1, 1995
Mid-Term Exam

Please answer each question in as much detail as necessary to provide a complete answer, but without gratuitous padding. You will have no more than 2 hours to finish the exam. Good luck.

1. Consider a monocentric model in which, through constrained maximization, the utility function:

$$U(z, q) = z^{1-\alpha} q^{\alpha},$$

is optimized subject to the constraint:

$$W = z + R(u)q + tu.$$

This yields the rent function:

$$R(u) = \overline{R}(W - tu)^{1/\alpha} / (\overline{W} - t\overline{u})^{1/\alpha}$$

a. Calculate the percentage change in rent per mile of distance.

b. How is the rent gradient related to parameter α? Why?

c. How is the rent gradient related to parameter t? Why?

2. We make considerable use of closed *v*. open-city models for our analyses. Please answer a set of questions using rigorous logic, either with or without the mathematical methods.

a. What are the primary distinctions between the "closed city" and the "open city" in the analyses?

b. Suppose that the citizens of the open city (e.g. Huntington Woods) receive a permanent annual property tax decrease. What will happen to the overall level of utility in Huntington Woods, and to the usual economic parameters of interest?

c. Suppose that the citizens of the closed city enjoy the construction of a new subway system that reduces the marginal cost of commuting anywhere within the city. Discuss in detail the impact on land rents.

3. Consider Mills's suburbanization equation:

$$\ln P_c = 2.365 + 0.654 \ln P + 0.372 \ln L_c - 0.00538 (\text{Pct. Black})$$

$$- 0.0299 (\text{Crime}) + 0.000013 (\text{Income})$$

a. According to this equation, what happens to the central city population as a percentage of total population as metropolitan areas grow. How do you explain this in economic terms?

b. According to this equation, what happens to the central city population density as central cities grow. How do you explain this in economic terms?

c. What do the various sociodemographic terms *(Black, Crime, Income)* say about decentralization in this equation?

4. Consider the following housing demand function.

$$Q = \alpha + \beta Y^P + \gamma P + \varepsilon.$$

a. Suppose that permanent income, Y^P is related to age, job training, gender, and education. Derive the impact of age on housing demand Q.

c. How do housing economists derive a housing price index P for this equation using hedonic methods. What would make the price of housing differ within a metropolitan area?

b. What happens to the permanent income elasticity as Y^P rises? Derive your answer in as much detail as is necessary.

5. Consider the article that you presented in class.

a. Discuss briefly one or more strengths of the article that you presented.

b. Discuss briefly one or more weaknesses of the article that you presented.

c. If you were extending the research that was presented, how would you improve on the analyses and the results.