INSTRUCTIONS: You have up to two and one half hours, if you need them, to complete the exam. The exam is "closed book - closed notes." There are six questions. You must do all 6. Answers should be as detailed as possible.

1. In a 1986 article, Goodman and Kawai estimated the following housing demand regression:

\[ \ln Q = 0.224 + 0.064 \times YP + 0.168 \times \frac{YT}{YP} - 1.062 \times \text{PRICE} \]

\[-0.149 \times \text{RACE} + ... \text{etc.} \]

where:

\[ YP = \text{Permanent Income} \]
\[ YT = \text{Transitory Income} \]
\[ \text{PRICE} = \text{Housing Price} \]
\[ \text{RACE} = 1 \text{ if black; 0 otherwise.} \]

The calculated permanent income elasticity was 0.80; the calculated price elasticity was -0.98.

a. Compute the impact of a one percent decrease in housing price on the price elasticity.

b. What does the monocentric model imply about incomes and housing prices? What would that suggest about the price and income elasticities for people in the central city as opposed to people in the suburbs.

c. Interpret the coefficient on RACE, and explain what it might mean.

2. Consider the following hedonic price function.

\[ P = \alpha_0 + \alpha_1 x_1 + \alpha'_1 x_1^2 + \alpha_2 \ln x_2. \]

a. Calculate the hedonic prices of components square feet, \( x_1 \), and land, \( x_2 \).
b. Does the hedonic price of $x_1$ increase or decrease as $x_1$ increases?

c. Suppose that the price of land fell. What would be the effect of this land price change on the hedonic price of square feet of housing space?

3. There have been numerous treatments of housing market discrimination in the literature.

a. How would one distinguish between segregation and discrimination, in the context of housing markets.

b. How does Courant explain the fact that in the presence of white prejudice, blacks may end up paying more for housing than do whites?

c. Roychoudhury and Goodman estimate the following ordered probit equation to explain the difference in rental units inspected.

\[ \text{Difference Inspected} = -3.45 + 1.93 \times \text{WTREAT} - 2.00 \times \text{AGNTBLK} + 0.058 \times \text{AGNTAGE} + \ldots \text{ etc.} \]

\[
\begin{align*}
\text{WTREAT} & = \text{White treatment;} \\
\text{AGNTBLK} & = 1 \text{ if agent was black; 0 otherwise;} \\
\text{AGNTAGE} & = \text{Agent age.}
\end{align*}
\]

Interpret this equation with respect to what it says about housing market discrimination.

4. Suppose that a small suburb, in a large metropolitan area, has 2,000 acres of land. 1,990 acres are “improved” and the other 10 acres are “bad.” The price of the “improved” land is $5,000 per acre; the price of the “bad” land is $1,000 per acre.

a. Given what we know about land improvement, what is your best estimate of the economic benefits of improving the 10 “bad” acres.

b. Is this project worth doing if it costs $35,000?
c. Who will be the net beneficiaries if the suburb taxes each land owner $10.00 per acre to perform the project, and finances the rest with a federal grant?

5. Consider the hedonic price paper that you prepared using the Detroit census data.

   a. Discuss briefly one or more strengths of the analysis that you prepared.

   b. Discuss briefly one or more weaknesses of the analysis that you prepared.

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

6. Consider a stretch of highway which is priced at \( p = 1 \). The demand for use of the road is:

   \[ p = 1000 - T, \]

   where \( T \) is the level of traffic flow.

   The road is subject to marginal congestion costs, which follow the function:

   \[ C = T + 0.1 T^2. \]

   a. Calculate the market-based equilibrium traffic flow?

   b. Taking congestion into account, calculate the optimum traffic flow.

   c. Calculate the road toll that would lead travelers to consume the optimal level of \( T \).