1. Define the bid rent function for the manufacturing sector of the land use model by writing the equation for land rent per acre. Explain why the bid rent function of the manufacturing sector has a negative slope. Why is the slope of this bid rent function convex to the origin?

2. Define the bid rent function of the office sector of the land use model by writing the equation for land rent per acre. Explain why the bid rent function of the office sector has a negative, concave slope if the office firms use fixed factor proportions. If the office firms engage in input substitution, what effect does it have on the bid rent function?

3. In selecting a building height (number of floors) which two costs does the office firm minimize? As office location changes from the center to more distant locations how does building height vary? Explain why.

4. Explain why the housing price function has a negative slope. How is the slope of the function affected if the size of the dwelling is assumed to stay the same at all locations. How is the slope affected if it is assumed that households obey the law of demand?

5. Define the residential bid rent function of the land use model. If housing is produced with fixed factor proportions, explain why the bid rent function has a negative slope and why the slope is convex. How is the slope of the bid rent function affected if housing is produced with factor substitution?

6. Using the normal profits theory, explain why land rent must decrease with increasing distance from the city center. Explain for all three sectors in the model of land use.

7. Using graphs, explain the equilibrium land use configuration of the 3 sector model. Explain the relative slopes of the bid rent functions of the 3 sectors. What are the three conditions for a long run equilibrium in the land market?

8. Explain why the following assumptions would make the slope of the residential bid rent function steeper.
    (a) time-cost of commuting
    (b) non-commuting travel to the CBD
    (c) two earner households

9. In U.S. cities, the wealthy tend to locate in the suburbs and the poor in the central city. Explain this income segregation using each of the following theories-models.
    (a) monocentric land use model
    (b) new suburban housing
    (c) fleeing central city problems
    (d) suburban zoning

10. Explain how each of the following developments contributed to the suburbanization of manufacturing.

a.　　the intracity truck
　　b.　　the intercity truck
　　c.　　interstate and circumferential highways
　　d.　　the automobile
　　e.　　single story plants
　　f.　　suburban airports

11. Explain how each of the following contributed to the suburbanization of population.
　　a.　　increases in real income
　　b.　　decreases in commuting cost
　　c.　　central city problems
　　d.　　following employers to the suburbs
　　e.　　public policy

12. After 1970, the suburban office employment increased at a much greater rate than that of the CBD. Explain the role of the following in contributing to this development.
　　a.　　e-mail
　　b.　　teleconferencing

13. In the 1982-1997 period, urban land consumption increased 47% while the urban population increased only 17%. This has been referred to as urban sprawl.
　　a.　　How have higher incomes and low travel costs contributed to low population density?
　　b.　　What government policies contribute to the problem of urban sprawl?

14. Virtually every large American city has the problem of highway congestion during peak commuting times. Economists have said that road congestion occurs because the social costs of the "marginal" road user are greater than the private costs incurred by the "marginal" user.
　　a.　　What are the external congestion costs of the "marginal" road user (one sentence answer).
　　b.　　Economists have suggested congestion taxes as a method to force road users to "internalize" the external costs of road use during peak periods.
　　　　1.　　Theoretically, what should the congestion tax be? (one sentence answer).
　　　　2.　　What are the possible road user reactions to congestion taxes during peak periods? Mention 5 potential reactions.
　　c.　　What are the principal criticisms of the congestion tax method of reducing road congestion during peak periods.

15. Given the practical problems of the congestion tax, several alternatives have been proposed. Explain the argument for each of the following alternatives and explain any problems of each approach.
　　a.　　increase the gasoline tax
　　b.　　CBD parking tax
　　c.　　widen the road

16. A mass transit subsidy will result in auto use and mass transit ridership levels that are closer to their social optimums than would occur without the subsidy. Use the graphical model discussed in class to explain the effect of a mass transit subsidy on auto use and transit ridership.

17. Answer the following concerning highway pricing and traffic volume in the long run.
    a.   Draw the ATC curve for a 4 lane road and explain why it is U shaped in terms of the road cost effect and the trip cost effect.
    b.   How is the long run optimum traffic volume determined? Draw a graph and label the axes, the curves, and the long run optimum traffic volume.
    c.   On the same graph from (b) label the congestion tax that is necessary to achieve the long run optimum traffic volume. Label any new curves that need to be put in the graph.

18. Answer the following concerning the partial equilibrium effects of congestion taxes on urban land use.
    a.   Assuming the revenue from a congestion tax is not redistributed to city residents, what effect would a congestion tax have on the residential bid rent curve?
    b.   If the government reduced other taxes after instituting a congestion tax, how would the resulting bid rent function compare to the bid rent function in (a)? Explain.
    c.   How does the residential bid rent curve in (b) compare to the residential bid rent function with no congestion taxes? Explain.
        d.   Explain how population density of the city is affected by congestion taxes.