

The purpose of the study guide is to provide a few extra problems, beyond those already worked on the homework sets. Problems similar to both these and the homework problems are likely to be included on the midterm exam.

1. Briefly identify and define the following terms. (Two or three sentences each should be sufficient.)
 - a. utility function
 - b. demand function
 - c. supply function
 - d. marginal cost function
 - e. production function
 - f. marginal product function
 - g. market clearing price
 - h. strict concavity
 - i. Leontief production function
 - j. Lagrange function
 - k. implicit function theorem
 - l. partial equilibrium model
 - m. General equilibrium model
2. Alice has a strictly concave twice differentiable utility function of the form $U=u(Q_1, Q_2)$ and a budget constraint of the form $W=P_1Q_1 + P_2Q_2$.
 - a. What is the economic meaning of W ?
 - b. What is the economic meaning of strictly concave?
 - c. Characterize the Alice's demand for good 2.
 - d. Does her demand function slope downward in prices? (Show this mathematically.)
 - e. Characterize the effect of an increase in W on her demand for good 2 mathematically.
3. Alfred has a Cobb Douglas utility function and plans and plans to spend W dollar on vanilla milk shakes and apple pies at McDonalds. He expects to spend $2/3$ of his money on milk shakes, which cost 3 times as much each as an apple pie.
 - a. What is his demand function for apple pie?
 - b. What are the implied exponents of his utility function?
 - c. Explain both answers mathematically and in words
 - d. Does Alfred's demand function have any "odd" properties?
4. Suppose that Acme is a price-taking firm and as the total cost function $C=c(Q, w, r)$.
 - a. Write down the function that characterizes Acme's profits.
 - b. Characterize Acme's profit maximizing output.
 - c. Characterize Acme's supply function.
 - d. Characterize the effect of an increase in wage rates on Acme's supply function.
 - e. Explain in words why an increase in the cost of capital tends to decrease Acme's supply function.

5. Draw a series of isocost curves and isoquants to illustrate Acme's output expansion curve. Label all details.
- Show how an increase in wage rates affects Acme's output expansion path.
 - Explain why your diagram indicates that Acme's cost for every output level increases because of the increase in wage rates.
 - The C-shaped isoquants normally used for such diagrams implies that it is possible to substitute one input for another in the production process. How would an increase in the productivity of capital affect the shape (slopes) of the isoquants?
 - On a separate diagram illustrate the effect of the increased productivity of capital on the firm's output expansion path.
 - How would such a change affect Acme's supply function in the previous problem? (Words are sufficient here, but you should also be able to characterize this affect mathematically.)
6. Suppose that the local McDonalds earns three times as much profit on milk shakes as it realizes on apple pies.
- If has the resources to make a total of 1000 units of milk shakes and apple pies (together), how many units of each should it make if it can sell all the units produced at their current market prices?
 - Suppose instead that half of its customers purchase two apple pies for every milk shake purchased and the other half purchases one apple pie for every milk shake produced (at the prevailing market price of each). Neither will purchase a milk shake unless there are a sufficient number of apple pies. It expects 500 of each type of consumer in the morning. How many milk shakes and apple pies should this McDonalds produce?
 - Explain your answer both mathematically and with words.
7. Suppose that the market for apple pastries is competitive and that the demand for such pastries is $Q^D = a - bP + cY - dT$ where P is the price of apple pastries, Y is average consumer income and T is the average temperature during the season of interest. The supply curve for apple pastries is $Q^S = eP - fw - gr$ where P is again the price of apple pastries, w is the average wage rates of employees in the pastry shop and r is the rental cost of capital.
- Find the equilibrium price and quantity in this market.
 - How does the equilibrium price change if average wage rates increase?
 - How does the equilibrium price change if consumer income increase.
 - How does the effect on the quantity sold differ in "b" and "c"?
- (Answer each part of the problem with both mathematics and words.)
8. Suppose that the market for pancakes is competitive and that the demand for pancakes in the morning is $Q^D = q^D(P, Y, T)$ where P is the price of pancakes, Y is average consumer income and T is the average temperature during the season of interest. The Supply curve is $Q^S = q^S(P, w, r)$ where P is again the price of pancakes, w is the average wage rates of employees in the pancake shop and r is the rental cost of capital.
- Characterize the equilibrium price and quantity in this market.
 - How does the equilibrium price change if average wage rates increase?
 - How does the equilibrium price change if consumer income increase.
 - How does the effect on the quantity sold differ for "b" and "c"?

9. Suppose that Apex is the only apple pie shop for many miles in an area of the Allegheny Mountains popular with hikers. It faces a downward sloping demand curve: $Q^D = a - bP + cY - dT$. Suppose that its cost function is: $C = (ew + fr)Q^2$.
- Characterize Apex's profit maximizing price and output.
 - Determine whether the selling price of Apex's apple pies is above its marginal cost at the profit maximizing output.
 - Suppose that wage rates increase—possibly because of an increase in the minimum wage laws in the state in which it operates. How should Apex adjust its output and pricing to account for that change?
10. Suppose that Acme opens an apple pie shop right next to Apex and sells apple pies that are essentially the same as those sold by Apex. Assume the same demand and cost functions for Acme and Apex are the same. (They are Marshallian rivals).
- Characterize the Cournot duopoly equilibrium price and output.
 - Is the price higher than marginal cost?
 - Is the price lower or higher than that chosen in the previous problem?
(Show these mathematically and in words.)
11. Suppose that Alfred and Alice are neighbors, and both are gardeners. Alice grows only potatoes and Alfred grows only corn. At the end of the growing season Alice has 200 potatoes and Alfred has 10 bushels of corn.
- Draw an Edgeworth Box to characterize this initial setting and their mutual endowments.
 - Assume that each has conventional C-shaped indifference curves. Draw a price line that generates a general equilibrium for this two-good economy. Label all details.
 - Suppose that Alice has a conventional strictly concave utility function. Characterize her excess demand function for potatoes. (Hint: her budget constraint is $P_c C + P_p P = 200P_p$.) Briefly explain each of your answers.
 - Identify and verbally describe the gains from trade that emerge among the two gardeners through trade.
 - Is the result Pareto optimal? (Discuss this both in terms of the diagram and in terms of the more general issues if time allows.)
12. Suppose that there are M firms in a market of interest. Each firm is characterized by a unique 2-input strictly concave production function. The inputs are labor and capital. Assume that M is sufficiently great that the market in which the firms sell can be regarded as perfectly competitive.
- Characterize each firm's cost function.
 - Characterize each firm's supply function.
 - Characterize the market supply function.
 - Characterize the effect of an increase in the rental cost of capital on the market supply (e.g. the quantity brought to market).
 - Explain briefly the steps taken and the logic of the overall characterization of the market supply.