Introduction to Microeconomics

Review Session

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April 13, 2024

Question 1

Suppose the demand for tomatoes amongst urban buyers is $Q_1 = 100 - p$ and the demand amongst rural buyers is $Q_2 = 60 - 2p$. What is the market demand function for tomatoes? Illustrate on a diagram.

Question 2

The market demand function for rice is $P = 1000 - 2Q_D$ and the supply function is $P = 100 + Q_S$, where P and Q are the price and quantity of a bag of rice.

1. What is the equilibrium quantity and price of rice?
2. The government now wants to impose a price floor of $P = 500$ for rice. What is the quantity traded after the price floor?
3. What is the excess or shortage of rice after the price floor?

Question 3

The market demand for textbooks is given by $Q = 100/p + 5p_d^2$ where Q is number of books, p is market price of textbooks, and p_d is the market price of digital books.

1. What is the price elasticity of demand of books at $(Q, p) = (1000, 400)$?
2. What is the cross-price elasticity of demand of textbooks with respect to digital books at $(Q, p_d) = (1000, 50)$?
3. Are digital books substitutes, complements or neither for textbooks?

Question 4

The market demand for a pharmaceutical drug is given by $Q_D = 1000$. The market supply of the drug is given by $P = 400 + Q_S$.

1. What is the equilibrium (Q^*, P^*) of the drug?
2. Now if the government decides to tax the pharmaceutical company at the rate of $\tau = 50$, what is the new equilibrium quantity of the drug being traded, and at what price?
3. What is the producer's and consumer's surplus after tax? What is the deadweight loss? How much tax revenue is generated by the government?

Question 5

Tom's utility function is given by $U(x, y) = (2x + y)^2$ where x is quantity of cake and y is quantity of icecream consumed.

1. What is Tom's $MRS(x, y)$?
2. If $P_x = 300$ and $P_y = 150$ and Tom has a budget of 1200, what is his optimal consumption bundle?
3. If there is an increase in price of icecream such that new $P_y = 400$, derive the Marshallian and Hicksian demand vectors (x, y) after the price increase.

Question 6

Siggi's quasilinear utility function is $U = 4\sqrt{q_1} + q_2$. His budget for these goods is $Y = 10$. Originally, the prices are $p_1 = p_2 = 1$. However, the price of the first good rises to $p_1 = 2$. Discuss the substitution, income, and total effect on the demand for q_1.

[Perloff Chapter 4, Ex 3.8]

Question 7

A firm produces safety pins and its production function is given by $Q = 5X + Z^{\alpha}$ where is X is hours of labour and Z is quantity of steel wire.

1. Under what conditions on the parameter α does the firm exhibit constant returns to scale?
2. What is the MRTS of the firm?
3. If the inputs prices of X and Z are given by $P_X = 15$ and $P_Z = 50$, and $\alpha = 2$, solve for the cost minimizing values of X and Z to produce $Q = 100$.

Question 8

Suppose you are the manager of a watchmaking firm operating in a competitive market. Your cost of production is given by $C = 200 + 2q^2$, where q is the level of output and C is total cost.

1. If the price of watches is $p = \$100$, how many watches should you produce to maximize profit?
2. What will the profit level be?
3. At what minimum price will the firm produce a positive output?

[Pindyck and Rubenfield Chapter 8, Ex 4]

Reference Reading

1. *Workouts in Intermediate Microeconomics 6e* by Hal Varian
2. *Microeconomics: A Modern Approach* by Andrew Schotter
3. *Microeconomics 9e* by Pindyck and Rubenfield
4. *Microeconomics* by Jeffrey Perloff