

14.01 Principles of Economics Fall 2018
Midterm Exam

True/False Question (20 minutes)

For each of the following statements, write whether it is True or False, and justify your answer. Points will be given based on your explanation.

1. John has an income of \$1,000. He spends \$100 on potatoes and \$900 on everything else. The government is planning to assist low income people like John. In particular, they are considering giving him either \$200 in cash or giving him \$200 in stamps that can only be used to buy potatoes.

(a) (4 minutes) If potatoes are a normal good, then John will be strictly better off with \$200 cash than with \$200 in stamps.

(b) (4 minutes) If potatoes are an inferior good, then John will be strictly better off with \$200 cash than with \$200 in stamps.

2. (4 minutes) Mary consumes only two goods, x and y . When the price of x increases, she consumes less of good y . Claim: y can't be a Giffen good.

3. (4 minutes) Consider the market for cars. All firms have the same production technology, and we know that the long-run average cost curve has a minimum at a cost of \$10,000 per car. Therefore, we can never observe a market equilibrium in which the equilibrium price is below \$10,000.

4. (4 minutes) Consider a firm that produces computers. Suppose that the market price of a computer is \bar{p} (both in the short-run and in the long-run). If in the short-run this firm decides to shut-down (i.e. produces $q = 0$), then it must be that in the long-run it decides to exit the market.

Long Question: Consumer Theory (45 minutes)

For this question, it is okay to have non-integer answers

Rebecca likes eating bagels (b) and drinking coffee (c) for breakfast. Her preferences can be represented by the function

$$U(c, b) = b^2c^3$$

1. (3 minutes) Graph Rebecca's indifference curve corresponding to utility level $u = 64$ (bagels should be on the x -axis).

2. Suppose that Rebecca budgets m dollars for breakfast every week, and the price of bagels and coffee at the cafe are p_b and p_c respectively.

(a) (3 minutes) Write down Rebecca's optimization problem when she is deciding how many coffees and bagels to consume each week.

(b) (4 minutes) Solve for how many coffee and bagels Rebecca would consume as a function of p_b, p_c , and m .

(c) (2 minutes) Are coffee and bagel normal goods or inferior goods? Why?

3. Now suppose that Rebecca budgets 10 dollars for breakfast every day and only eats at Flour Bakery, where the price of a bagel is 1 dollar and the price of a cup of coffee is 4 dollars. However, because Rebecca is part of the loyalty program at the cafe, Rebecca receives a 50 percent discount on coffee.

(a) (3 minutes) Graph Rebecca's budget set with bagels on the x-axis.

(b) (2 minutes) Find the number of bagels and cups of coffee that Rebecca chooses to buy.

4. After a while, Flour Bakery realizes it is losing money because too many people are using its loyalty program to buy coffee. Flour Bakery changes its loyalty program: now, a customer only gets a 50 percent discount on the first three cups of coffee they buy in any given day.

(a) (3 minutes) Graph Rebecca's new budget set (carefully label important points on the graph)

(b) (4 minutes) What quantity of coffee and bagels would Rebecca choose to consume given the new budget set? How does this answer compare with the previous result? Explain.

5. Flour Bakery is still losing money. It decides to get rid of its loyalty program altogether so that no one gets any discounts on coffee.

(a) (2 minutes) Find Rebecca's consumption of coffee and bagels without any discounts.

(b) (4 minutes) Comparing your answer to the answer you got in part 3b: how much of the change in Rebecca's consumption of coffee is due to the substitution effect? How much is due to the income effect? You do not need to solve for the actual numbers, drawing the graph is enough.

6. Disappointed that the loyalty program has been canceled, Rebecca goes searching for another cafe and discovers that Tatte sells coffee for 2 dollars and bagels for 2 dollars. The quality of coffee and bagels is the same between Tatte and Flour Bakery.

(a) (2 minutes) How many bagels and coffee does Rebecca buy at Tatte?

(b) (2 minutes) Rebecca only has time to go to one coffee shop before class. Which one does she go to? Why?

- (c) (4 minutes) Now suppose that Rebecca's utility function for coffee and bagels is given by $U(c, b) = \sqrt{b + c}$. Which coffee shop does she go to and how much of each good does she consume at that coffee shop? Why should your answer change compared to parts a) and b)? (Hint: it is possible to arrive at the solution for this problem without doing any math. If you do so, please explain the reasoning you used to arrive at your answer.)

7. Now suppose that there are 30 consumers, all with utility for coffee and bagels $U(c, b) = b^2c^3$. Suppose that ten of the consumers budget five dollars for breakfast, ten of the consumers budget ten dollars for breakfast, and ten budget fifteen dollars for breakfast.

(a) (3 minutes) Find the aggregate demand curve for coffee.

(b) (4 minutes) Suppose that the supply curve for coffee is given by $Q^s(P) = 5P$. What is the equilibrium price and quantity in the market for coffee?

3. (5 minutes) Recall that all the clam chowder stores in the Boston area share the same cost function above. Also, a study has shown that the demand for clam chowder takes the following form, $Q_D = 235 - 5p$. What is the long-run market price and the long-run number of stores? What is the quantity produced by each store? What are their profits?
4. Suppose that 15 out of the clam chowder stores that decided to operate in the long-run in the previous question are in Cambridge –one of the cities in the Boston area. In addition, suppose that Cambridge introduces a constant subsidy of \$33 for each of these 15 clam chowder stores if $q > 0$, that is, each of the 15 stores gets a \$33 check from the city government if they decide to produce a positive quantity of clam chowder.
- (a) (2 minutes) What is the new cost function for one of Cambridge’s clam chowder stores (denote it by $C^C(q)$)?

(b) (6 minutes) Compute the marginal cost and average total cost for this store, as well as the supply curve. Does the marginal cost change? Why or why not?

(c) (2 minutes) Solve for the new supply function for one of the Cambridge stores.

5. Consider the market for Clam Chowder in the Boston area after the introduction of the subsidy in Cambridge for those 15 stores (that is, other clam chowder stores that open in Cambridge do not get the subsidy).

(a) (5 minutes) What is the long-run market price in the Boston area? And the number of stores of each type? Explain the intuition.

(b) (6 minutes) How many clam chowder units does each subsidized store sell? What about unsubsidized stores? What are the profits of each of the subsidized stores? And the profits of the unsubsidized stores? Explain why.

6. (6 minutes) Demand for clam chowder in the Boston area drops after the subsidy policy and becomes $Q_D = 207 - 5p$. What is the long-run price and number of firms? How many stores will there be in the Boston area and how many of them will be subsidized? How many clam chowder units do subsidized stores sell? What about unsubsidized stores?

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