

Econ306–Intermediate Microeconomics

Fall 2007

Midterm exam

The exam consists of 5 questions and one bonus questions. There is also one extra credit part in question 3. If you have the time, you can attempt the bonus questions and earn extra credit.

The duration of the exam is 75 minutes. DO NOT OPEN the exams until you are told to do so and STOP writing when you are told that the exam is over. **Failure to comply will result in a 10% loss in the grade.**

Do not forget to write (and bubble) your name and university ID number on the scantron.

NO PROGRAMMABLE OR FINANCIAL CALCULATORS ARE ALLOWED. Only simple or scientific calculators can be used.

GOOD LUCK!

Question 1

Perry lives on avocado and beans. The price of avocados is \$10, the price of beans is \$5, and his income is \$40.

- (i) Show Perry's budget line on a graph with avocados on the horizontal axis and beans on the vertical axis. Calculate the intercepts with the two axes and the slope of the budget line.
- (ii) Draw another budget line showing what Perry's budget would be if his income doubled, the price of avocados doubled, and the price of beans stayed the same. Calculate the intercepts with the two axes and the slope of this new budget line.
- (iii) If Perry's income stayed the same at \$40, which price or prices should change and by how much in order for him to face the same budget constraint as in the previous question? If the good(s) whose price changed are normal, show on the graph the substitution and the income effects and explain how the quantity consumed of the good(s) changed.

Question 2

Max has the utility function $U(x, y) = x(y + 1)$. The price of x is \$2 and the price of y is \$1. Income is \$10.

- (i) Derive the marginal utility of both goods.
- (ii) Find the optimal consumption bundle: how much x and how much y does Max demand? What is the marginal rate of substitution at the optimum?
- (iii) If his income doubles and prices stay unchanged, will Max's demand for both goods double?

Question 3

Patience has a utility function depending on her consumption today c_0 and on her consumption tomorrow (next period) c_1 . She will earn 100 units of consumption in each period (i.e., $I_0 = I_1 = 100$). She can borrow or lend at an interest rate of 10%.

- (i) Write down her intertemporal budget constraint.
- (ii) Calculate the intercepts of the budget line with the horizontal (consumption today) and with the vertical (consumption tomorrow) axes, as well as the slope of the budget line.
- (iii) Graph the budget line, making sure to emphasize her endowment point.

(iv) Suppose that Patience chose to consume 80 units of consumption today. How would she be affected by a drop in the interest rate from 10% to 7.5%? Make sure to describe the substitution and the income effects.

(v) *extra credit* Suppose Patience's utility function is of the form $U(c_0, c_1) = \sqrt{c_0} + 2\sqrt{c_1}$. What is the marginal utility of consumption today and of consumption tomorrow? Calculate the optimal allocation of consumption between the two periods (c_0 and c_1).

Question 4

Beth works for the federal government and her job is to analyze the market for oranges.

(i) Suppose she found that the demand function is $Q = 50 - 5p$, where Q is the quantity of oranges demanded and p is the ongoing price per pound. Graph the demand curve (remember to label the intercepts).

(ii) The federal government is considering imposing some restrictions on the production of oranges because of environmental concerns. The current price is \$4 per pound, but after the restrictions it would increase to \$5 per pound. What is the consumer surplus before and after the restrictions? What is the loss in consumer surplus due to the restrictions? If a consumer advocacy group would try to bribe Beth to convince federal authorities that the restrictions should not be imposed, how much would they be willing to spend?

(iii) Now suppose that Beth does not know the demand function, but she observed that when the price of oranges grew from \$4 to \$4.05 per pound, the quantity of oranges demanded fell from 30 to 29 pounds. What is the point elasticity of demand? Using this estimate, by how much would demand decrease if the government were to impose the quantity restrictions and raise the price from \$4 to \$5 (a 25% increase in the price)?

(iv) After sitting in Econ306, Beth learns that you need to use the arc elasticity of demand for large price changes. She knows that, on year ago, when the price of oranges fell from \$4 to \$3 per pound, the quantity demand increased from 30 to 50 pounds. What is her estimate of the arc elasticity? Using this estimate, what is the effect of the government restrictions on the demand for oranges?

Question 5

Joanne has a beauty salon and she makes \$4,000 a month. Despite her uncontested talent, she tends to be absent minded at times. As a result, there is a 10% chance each month that she will injure one of her customers and she will get sued. In that case, she will end up losing all her income that month. Since she is risk averse, she is looking into buying insurance.

(i) What would be the premium of an actuarially fair insurance for Joanne? Sketch the budget constraint she would face, if she could buy the fair insurance, on a graph with consumption if not sued on the vertical axis and consumption if sued on the horizontal axis. Make sure to label the endowment point and to calculate the slope of the budget line. How much insurance will she buy?

(ii) Suppose that, instead, Joanne can only buy insurance at a \$0.15 premium. Draw the budget line that she faces (again, remember to label the endowment point and to calculate the slope of the budget line). Is this line flatter or steeper than the one in the previous part? How much insurance will she buy now? Compare your answer to the one in the previous part.

Question 6 (*extra credit*)

Elmo finds himself at a soda vending machine on a hot and dusty Sunday. The machine requires exact change: one dollar bill and two dimes. No other combination will make anything come out of the machine. No stores are open and no one is in sight. Elmo is so thirsty that the only thing he cares about is how many sodas he can buy with the change in his pocket; the more he can buy, the better. From Elmo's point of view, preferences are now defined over dollar bills and dimes (and utility is derived from drinking the sodas that he can afford). What kind of goods are the dollar bills and dimes, in this particular situation? How many sodas can he buy with 2 dollar bills and 3 dimes? Draw an indifference curve describing Elmo's preferences.