

Problem Set #3

Sonoma State University
Economics 305-Intermediate Microeconomic Theory

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Suppose that you consume only two goods pizza (X) and beer (Y). Your budget on pizza and beer is \$120 per month. The price of pizza is \$3.00 per slice and the price of beer is \$1.50 per beer.

- (1) What is the largest possible number of pizza slices you could consume in a month given your budget?
- (2) What is the largest possible number of beers you could consume in a month given your budget?
- (3) If you purchased 30 slices of pizza in a given month, how many beers could you buy?
- (4) If you purchased X units of pizza in a given month, what is the formula for the number of beers (Y) you could buy?
- (5) Show graphically the budget constraint for pizza and beer. Be sure to correctly label all relevant points.

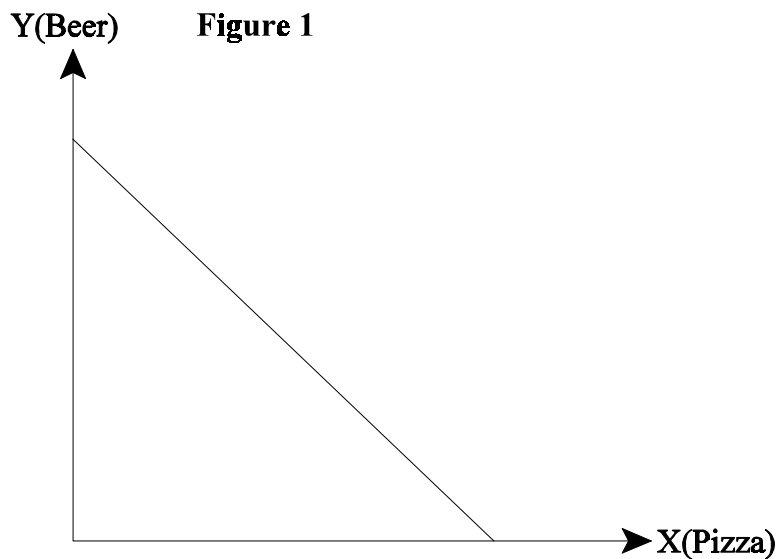


Figure 2

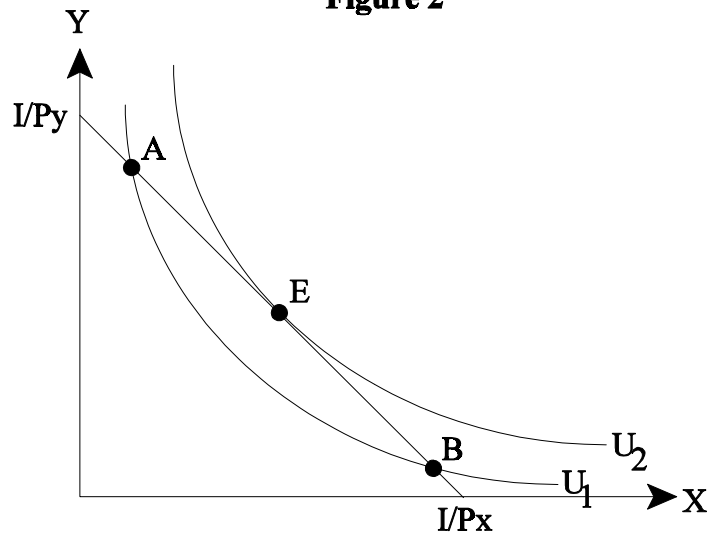


Figure 2 shows the budget constraint and indifference curves for a typical consumer.

- (6) Show that the slope of the budget constraint is equal to $-P_x / P_y$.
- (7) Demonstrate that at the equilibrium level of consumption, point E in Figure 2, the equilibrium condition $MRS = P_x / P_y$ is equivalent to the utility maximizing rule $MU_x / P_x = MU_y / P_y$. Explain fully.
- (8) Why is point A in Figure 2 not an equilibrium (i.e., utility maximizing) consumption bundle? How should income be reallocated to maximize utility? Explain fully.
- (9) Why is point B in Figure 2 not an equilibrium (i.e., utility maximizing) consumption bundle? How should income be reallocated to maximize utility? Explain fully.
- (10) Show that the equilibrium consumption bundle is invariant to a proportional change in prices and income.

Figure 3

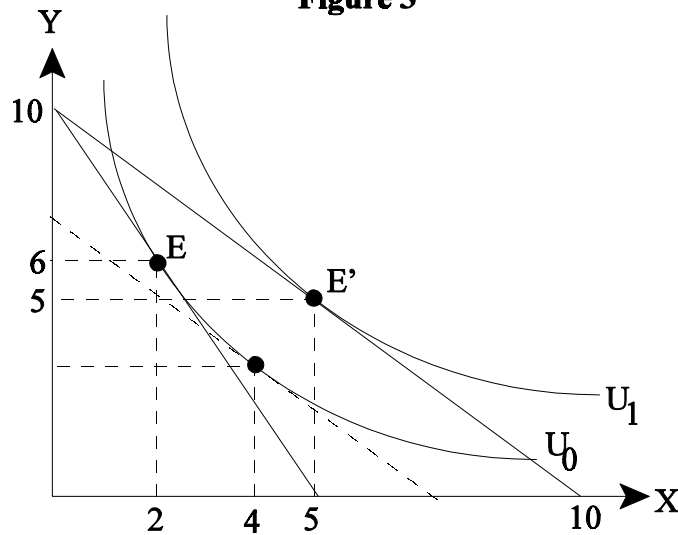


Figure 3 shows an equilibrium consumption bundle at point E when the price of X is $P_X = \$6$ per unit and the price of Y is $P_Y = \$3$ per unit. Suppose the price of X falls to \$3 per unit, with equilibrium at E'.

- (11) What is the consumer's income at the equilibrium consumption bundle E?
- (12) What is the consumer's income at the equilibrium consumption bundle E'?
- (13) Identify the substitution effect of the price change.
- (14) Identify the income effect of the price change. Is good X a normal good or an inferior good?
- (15) Derive the equation for a linear demand curve for good X based on the information in Figure 3. Show graphically.

- (16) Suppose a consumer's marginal rate of substitution of Y for X is 5, that is $MU_x / MU_y = 5$. If the price of X is \$9.00 per unit and the price of Y is \$2.00 per unit, is this consumer spending too much of her income on Y. Explain your answer and show graphically.

- (17) Suppose that a rational consumer consumes only two goods X and Y. Assume that her marginal rate of substitution of Y for X is given by the following formula:

$$MRS = MU_x / MU_y = Y/X$$

That is the consumer's MRS is simply equal to the ratio of the number of units of Y consumed to the number of units of X consumed. Assume that the consumer's income is \$100, the price of X is \$5 per unit and the price of Y is \$10 per unit. What is the equilibrium quantity of X and Y consumed?

HINT: Use the equilibrium conditions to solve the problem i.e.,

$$(1) MRS = P_x / P_y$$

$$(2) I = P_x X + P_y Y$$