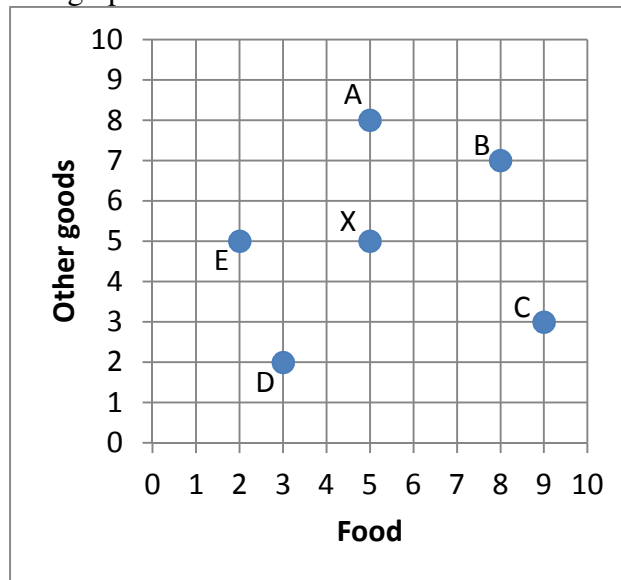


EXAMINATION #2 VERSION B
“Consumers and Demand”
October 3, 2013

INSTRUCTIONS: This exam is closed-book, closed-notes. Calculators, mobile phones, and wireless devices are NOT permitted. Point values for each question are noted in brackets.

I. SHORT ANSWER: Please write your answers in the boxes on this question sheet. Use margins for scratch work.

(1) [Preferences: 5 pts] The graph below shows six bundles or combinations of goods.



The consumer’s indifference curves are unknown, but the consumer’s preferences are assumed to follow the assumption of *monotonicity*. Compare bundle X to the other five bundles from the consumer’s perspective. In each box below, write “*more preferred than bundle X,*” “*less preferred than bundle X,*” or “*cannot be determined.*”

a. Bundle A:

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b. Bundle B:

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c. Bundle C:

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d. Bundle D:

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e. Bundle E:

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(2) [Price elasticity of demand: 10 pts] Suppose the price elasticity of demand for cable TV service is -1.2 , and the cable TV company raises its rates by 5% .

- a. Is the demand for cable TV service *elastic* or *inelastic* ?
- b. Will the quantity demanded of cable TV service *increase* or *decrease*?
- c. By about how much?
- d. Will the revenue received by the cable TV company *increase* or *decrease*?
- e. By about how much?

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(3) [Income elasticity of demand: 10 pts] Suppose that a consumer's income rises by 5% , and the income elasticity of demand for gasoline is 0.8 .

- a. Does the income elasticity indicate that gasoline is an *inferior* good, a *necessary* good, or a *luxury or superior* good?
- b. Will the quantity demanded of gasoline *increase* or *decrease*?
- c. By about how much?
- d. Will the share of the consumer's budget devoted to gasoline *increase* or *decrease*?
- e. By about how much?

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(4) [Slutsky equation: 10 pts] The Slutsky equation in elasticity form is given by the following equation.

$$\epsilon = -S \eta + \epsilon^{\text{comp}}$$

where, as usual, ϵ denotes the own-price elasticity of demand, S denotes the share of total consumer spending devoted to the good (a fraction), η denotes the income elasticity of demand, and ϵ^{comp} denotes the compensated demand elasticity. Suppose that for housing, $\epsilon = -1.1$, $S = 0.25$, and $\eta = 0.8$.

- a. Compute the compensated demand elasticity (ϵ^{comp}).

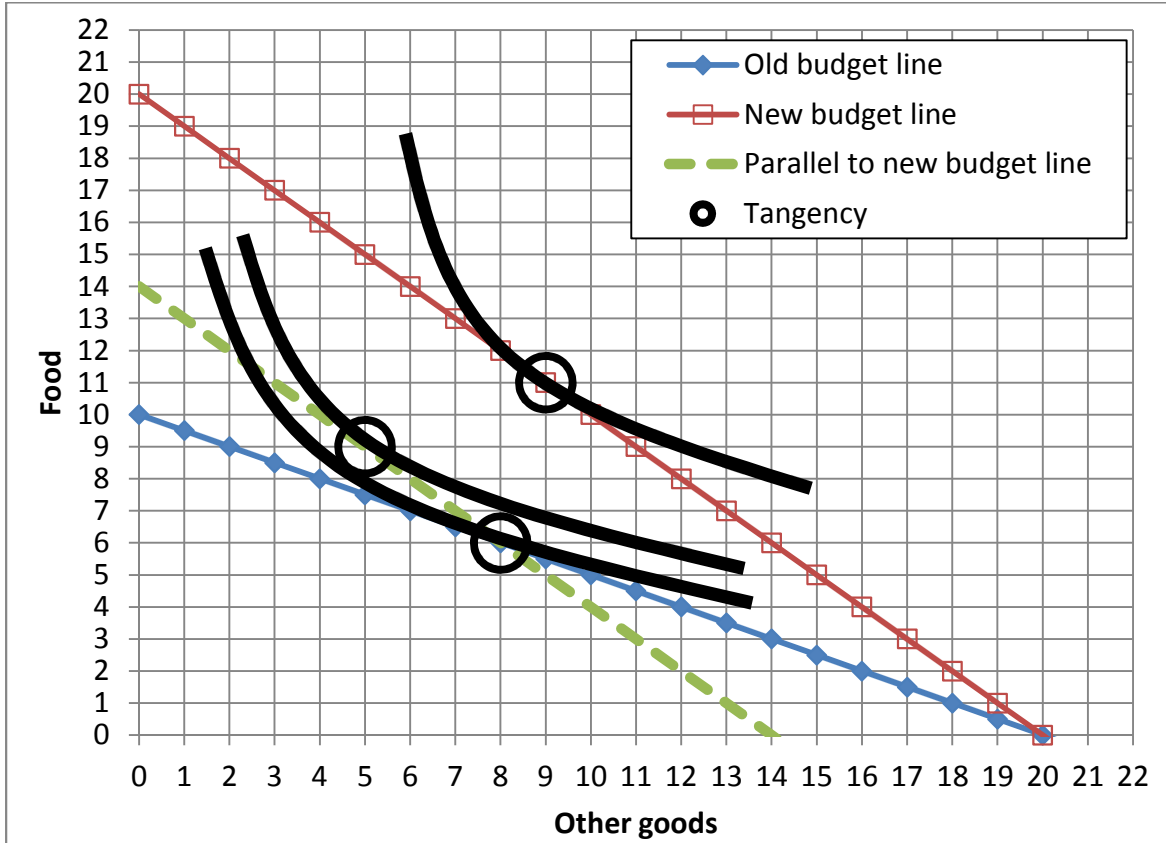
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Suppose the price of housing rises by 10% , but the consumer's income does *not* change.

- b. Does the quantity demanded of housing *increase* or *decrease*?
- c. By about how much?
- d. How much of this change is due to the income effect alone?
- e. How much of this change is due to the substitution effect alone?

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(5) [Substitution and income effects: 12 pts] Consider the indifference-curve diagram below. Assume the consumer has income equal to \$80. The straight lines are budget lines. The curves are consumer's indifference curves.



- What was the price of food on the old budget line?
- Given the old budget line, how much food does the consumer demand?
- What is the price of food on the new budget line?
- Given the new budget line, how much food does the consumer demand?
- Compute the change in quantity of food demanded due to the substitution effect: Δq^{sub} .
- Compute the change in quantity of food demanded due to the income effect: Δq^{inc} .

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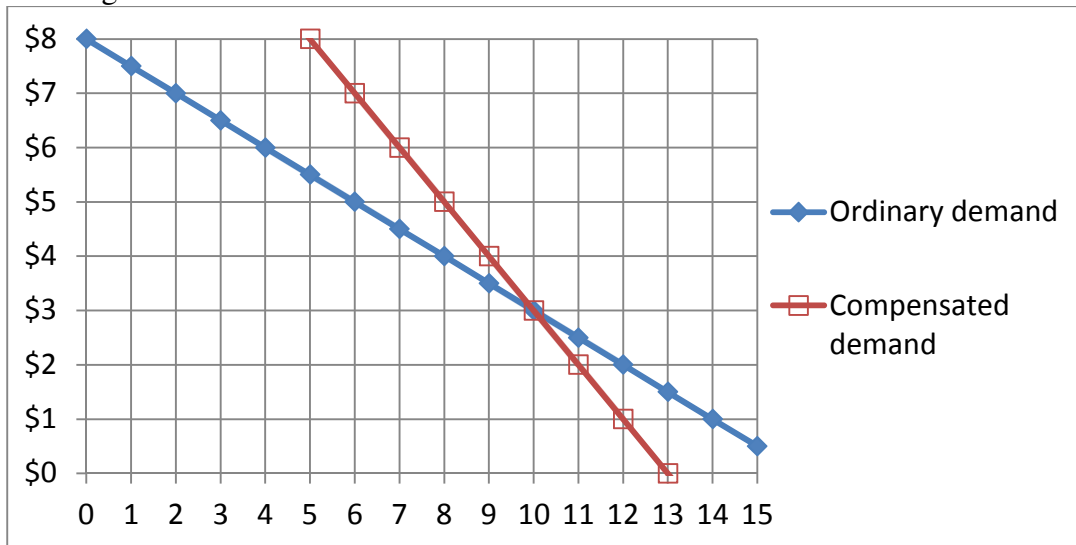
(6) [Cost-of-living indexes: 6 pts] Suppose we are given the following data on prices and quantities consumed of energy and other goods.

	Energy		Other goods	
	Price	Quantity	Price	Quantity
Old period	\$2	10 units	\$5	6 units
New period	\$3	10 units	\$5	16 units

Assume that all cost-of-living indexes equal 100 in the old period.

- Compute the Laspeyres cost-of-living index in the new period.
- Compute the Paasche cost-of-living index in the new period.
- Give a *formula* for the Fisher cost-of-living index in the new period.

(7) [Consumer welfare: 6 pts] The following graph shows the ordinary and compensated demand for a good.



Suppose the price of the good falls from \$3 to \$1.

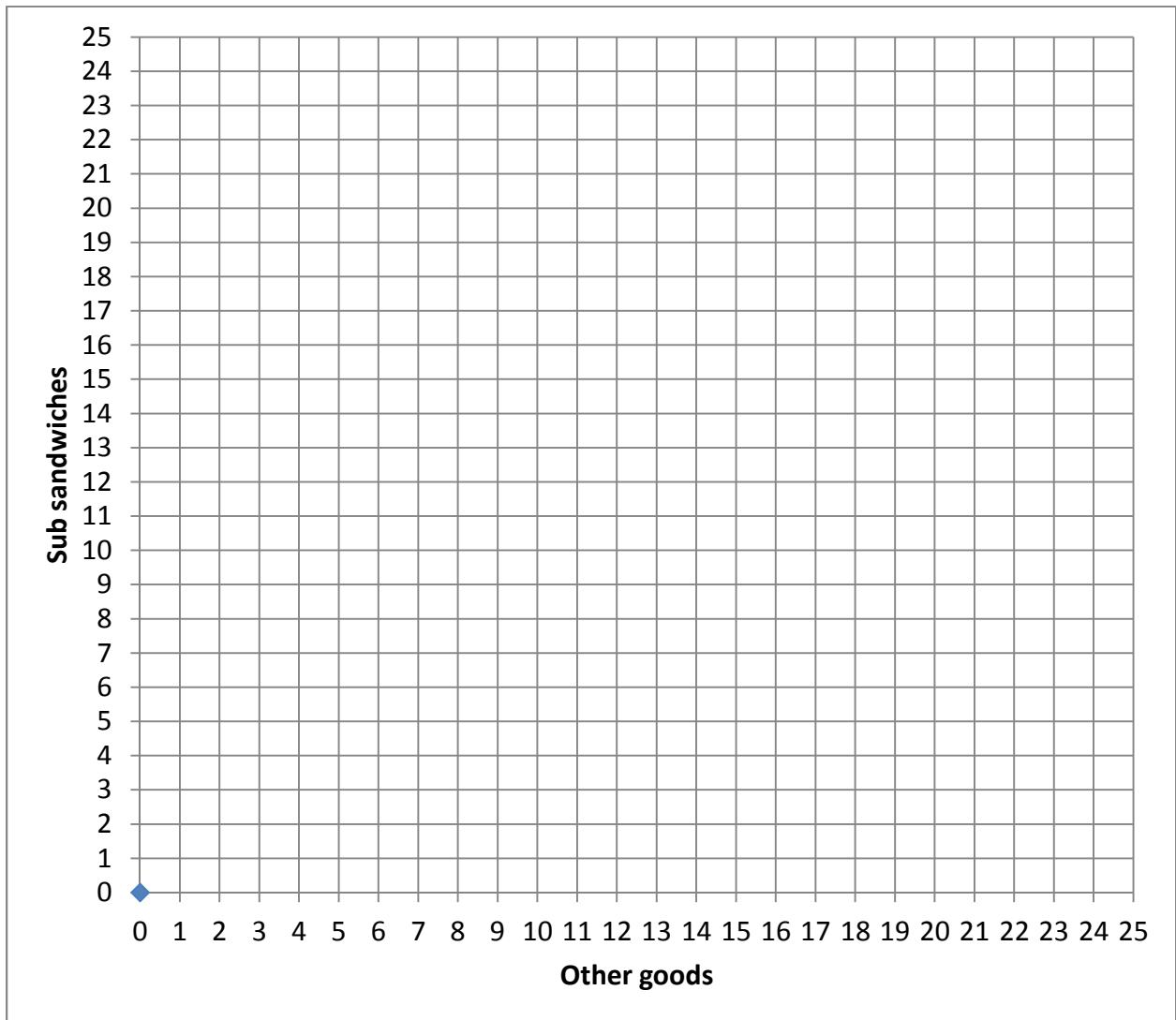
- Are consumers *better off* or *worse off*?
- Compute the change in consumer surplus.
- Compute the compensating variation in income.

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II. PROBLEMS: Please write your answers in the boxes on this question sheet. Show your work and circle your final answers.

(1) [Budget constraint: 4 pts] Suppose the price of sub sandwiches is \$5 and the price of other goods is \$10. Suppose a consumer has \$100 to spend on these two goods.

- a. [2 pts] Compute the slope of the budget line with sub sandwiches on the vertical axis and other goods on the horizontal axis.
- b. [2 pts] Graph the budget line below.



(2) [Budgets and choice: 12 pts] A consumer has the following utility function:
 $U(q_1, q_2) = q_1^3 q_2^2$, where q_1 denotes the quantity of energy and q_2 denotes the quantity of other goods. The price of energy is \$4 and the price of other goods is \$5. The consumer has \$100 in income to spend on these items.

- a. [4 pts] Give an equation for the consumer's budget line. The variables q_1 and q_2 should be the only unknowns.

- b. [4 pts] Find a formula for the consumer's marginal rate of substitution in consumption of other goods for energy—that is, the slope of the consumer's indifference curve with energy on the vertical axis and other goods on the horizontal axis. The variables q_1 and q_2 should be the only unknowns. Circle your final answer.

- c. [4 pts] Solve for the quantities of energy (q_1^*) and other goods (q_2^*) that this consumer will choose. Circle your final answers.

(3) [Individual demand: 12 pts] A consumer has the following utility function:

$U(q_1, q_2) = q_1^3 (q_2 - 4)$, where q_1 denotes the quantity of food and q_2 denotes the quantity of other goods.

- a. [4 pts] Find a formula for the consumer's marginal rate of substitution in consumption of other goods for food—that is, the slope of the consumer's indifference curve with food on the vertical axis and other goods on the horizontal axis. The variables q_1 and q_2 should be the only unknowns. Circle your final answer.

Let p_1 denote the price of food and let p_2 denote the price of other goods. Let I denote the consumer's income.

- b. [4 pts] Solve for the consumer's demand function for food—that is, the formula showing q_1^* as a function of p_1 , p_2 , and I . Show your work and circle your final answer. [Hint: check that your answer is homogeneous of degree zero.]

- c. [4 pts] Solve for the consumer's demand function for other goods—that is, the formula showing q_2^* as a function of p_1 , p_2 , and I . Show your work and circle your final answer. [Hint: check that your answer is homogeneous of degree zero.]

(4) Elasticity: 8 pts] Suppose an alleged demand function is $q_1^* = \frac{I}{10 p_1} - \frac{5 p_2}{p_1} + 2$.

- a. Is this function homogeneous of degree zero in income and prices? Justify your answer.

- b. Is good #1 an ordinary good or a Giffen good? Justify your answer.

- c. Is good #1 a normal good or an inferior good? Justify your answer.

- d. Are goods #1 and #2 substitutes, complements, or unrelated in demand? Justify your answer.

III. CRITICAL THINKING: Answer just *one* of the questions below (your choice). [5 pts]

(1) Amanda's utility function is $U = q_1 q_2$, where q_1 denotes the quantity of food and q_2 denotes the quantity of other goods. Suppose the price of food is $p_1 = \$6$ and the price of other goods is $p_2 = \$4$. Compute the *minimum* amount of income that Amanda must have to attain a target level of utility of $\bar{U} = 600$ utils. Show your work and circle your final answer.

(2) Suppose a consumer's demand function for good 1 takes the following form:

$$q_1^* = 27 p_1^\epsilon p_2^\alpha I^\eta,$$

where p_1 is the good's own price, p_2 is the price of another good, and I is the consumer's income. If the demand for good 1 is homogeneous of degree zero in all prices and income, then what must be the value of the *sum* of the exponents: $(\epsilon + \alpha + \eta)$? Justify your answer with algebra.

[end of exam]