ECON 173 - Intermediate Microeconomic Analysis
Drake University, Fall 2013
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Signature: _____

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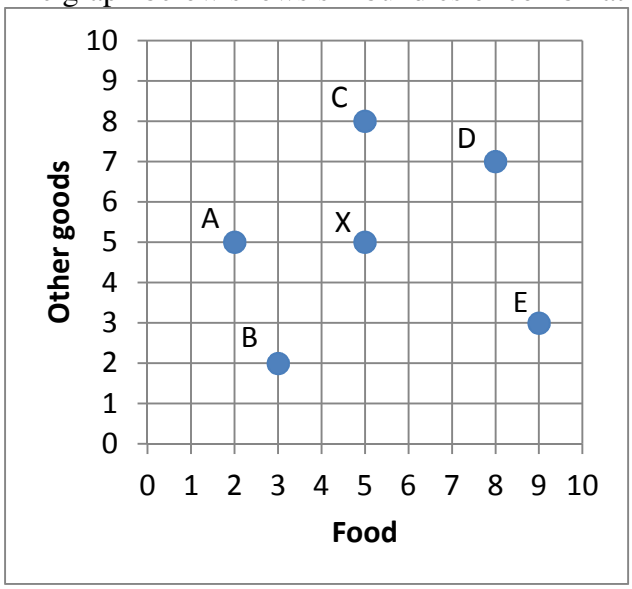
EXAMINATION #2 VERSION A
"Consumers and Demand"
October 3, 2013

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 indifferences 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:	
b. Bundle B:	
c. Bundle C:	
d. Bundle D:	
e. Bundle E:	

(2) [Price elasticity of demand: 10 pts] Suppose the price elasticity of demand for water is –0.6, and the water utility raises its rates by 5 %.

a. Is the demand for water *elastic* or *inelastic* ?

b. Will the quantity demanded of water *increase* or *decrease*?

c. By about how much? %

d. Will the revenue received by the water utility *increase* or *decrease*?

e. By about how much? %

(3) [Income elasticity of demand: 10 pts] Suppose that a consumer's income rises by 5%, and the income elasticity of demand for air travel is 1.4 .

a. Does the income elasticity indicate that air travel is an *inferior* good, a *necessary* good, or a *luxury or superior* good?

b. Will the quantity demanded of air travel *increase* or *decrease*?

c. By about how much? %

d. Will the share of the consumer's budget devoted to air travel *increase* or *decrease*?

e. By about how much? %

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

$$\varepsilon = -S\,\eta + \varepsilon^{comp}$$

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, $\varepsilon = -0.9$, $S = 0.25$, and $\eta = 1.2$.

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

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

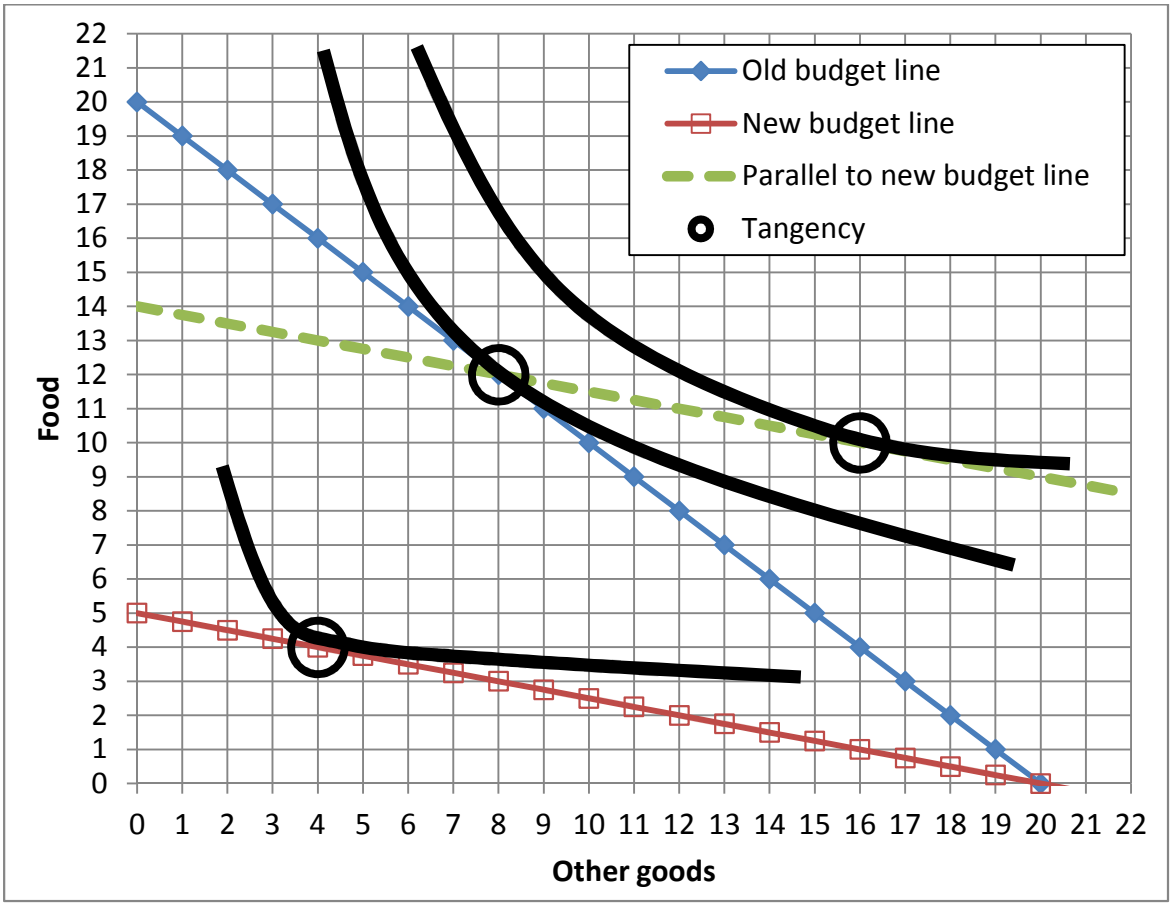
b. Does the quantity demanded of housing *increase* or *decrease*?

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? %

(5) [Substitution and income effects: 12 pts] Consider the indifference-curve diagram below. Assume the consumer has income equal to \$100. The straight lines are budget lines. The curves are consumer's indifference curves.



a. What was the price of food on the old budget line?	\$
b. Given the old budget line, how much food does the consumer demand?	units
c. What is the price of food on the new budget line?	\$
d. Given the new budget line, how much food does the consumer demand?	units
e. Compute the change in quantity of food demanded due to the substitution effect: Δq^{sub} .	units
f. Compute the change in quantity of food demanded due to the income effect: Δq^{inc} .	units

(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	4 units	$3	4 units
New period	$2	10 units	$5	4 units

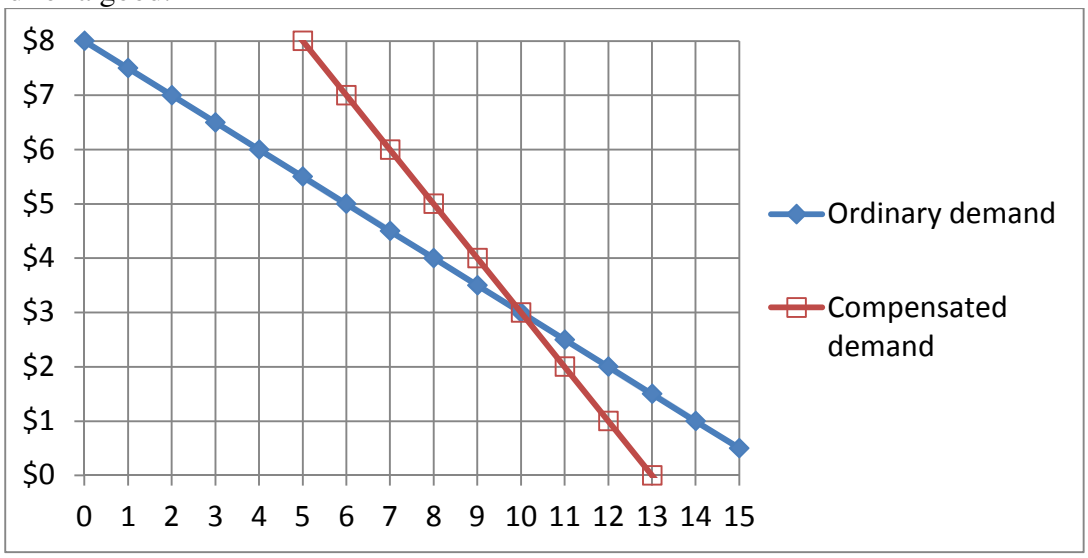
Assume that all cost-of-living indexes equal 100 in the old period.

a. Compute the Laspeyres cost-of-living index in the new period.

b. Compute the Paasche cost-of-living index in the new period.

c. 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 rises from $3 to $7.

a. Are consumers *better off* or *worse off*?

b. Compute the change in consumer surplus.

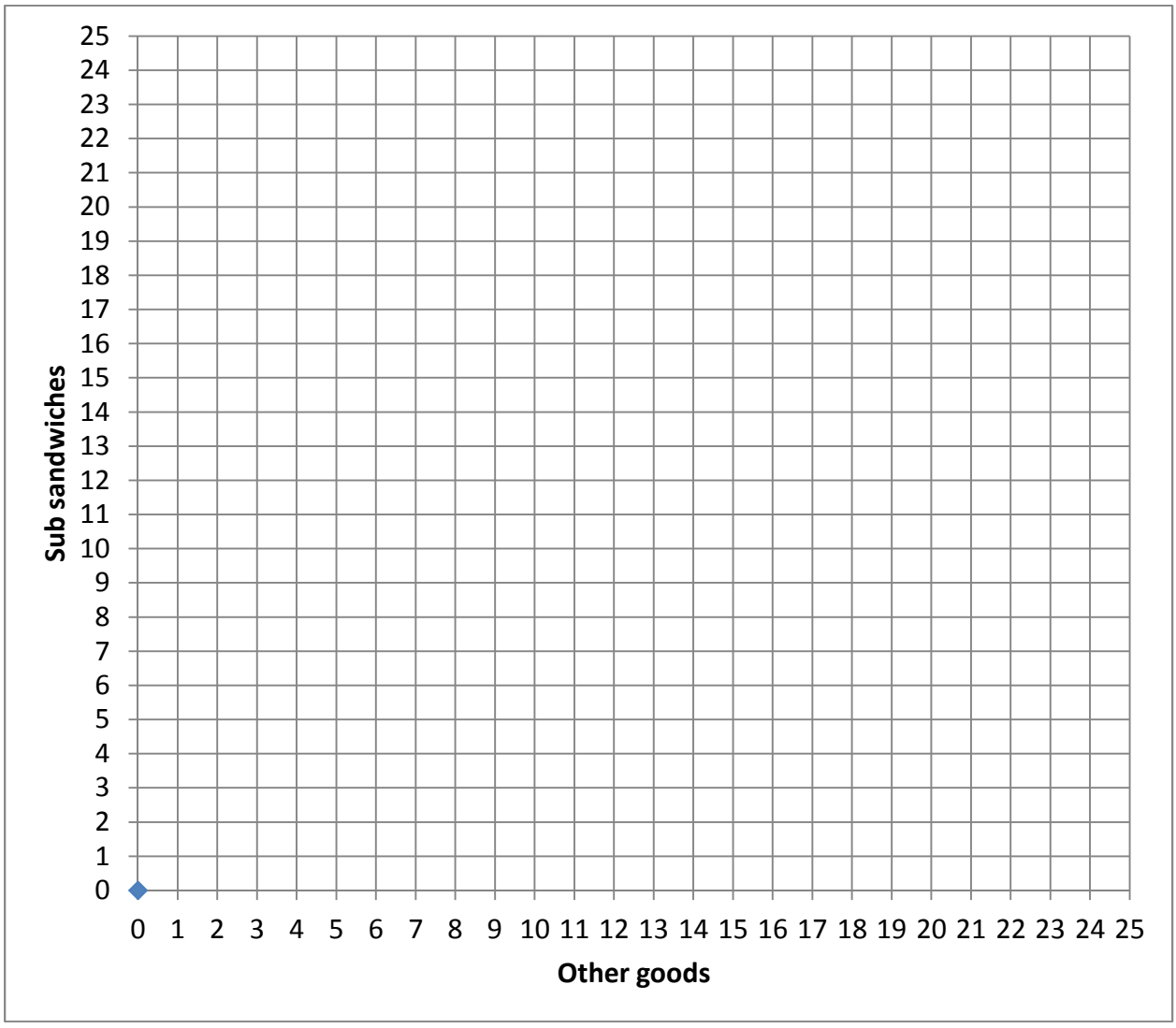
c. Compute the compensating variation in income.

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 $3. Suppose a consumer has $60 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: $U(q_1,q_2) = q_1 q_2^4$, where q_1 denotes the quantity of energy and q_2 denotes the quantity of other goods. The price of energy is \$2 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: $U(q_1,q_2) = (q_1 + 3)\, q_2^2$, 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 $q_1^* = \frac{I}{5\,p_1} + \frac{2\,p_2}{p_1} + 6.$

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:

$$q_1^* = 27\, p_1^{\varepsilon}\, p_2^{\alpha}\, I^{\eta},$$

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: $(\varepsilon + \alpha + \eta)$? Justify your answer with algebra.

[end of exam]