Intermediate Microeconomic Analysis (Econ 173)
Drake University, Fall 2011
William M. Boal

EXAMINATION #2 ANSWER KEY

Version A

I. MULTIPLE CHOICE

(1)d. (2)c. (3)c. (4)b. (5)d.

II. SHORT ANSWER

(1) a. inelastic b. decrease c. 4% d. increase e. 1%.

(2) a. luxury or superior good b. increase c. 5% d. increase e. 1%.

(3) a. -3/5 b. -8 c. $40 d. -2 hamburgers
e. -6 hamburgers.

(4) a. $5 b. 8 units c. $15 d. 3 units e. 2 units f. 3 units.

(5) a. L=135 b. P=120 c. F = $\sqrt{135 \cdot 120} = 127.3$.

(6) a. better off b. $100 c. $90 .

III. PROBLEMS

(1) a. -5/2 = -2.5 b. straight line with intercepts at music=20 and other=8.

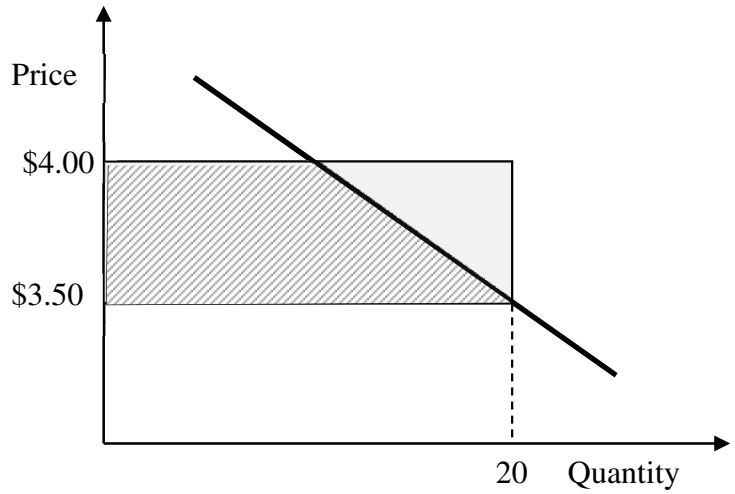
(2) a. $180 = 4\ q_1 + 3\ q_2$ b. MRSC = $\frac{3q_1}{2q_2}$ c. $q_1^* = 18$, $q_2^* = 36$.

(3) a. MRSC = $\frac{q_1 - 10}{q_2}$ b. $q_1^* = \frac{I}{2p_1} + 5$ $q_2^* = \frac{I}{2p_2} - \frac{5p_1}{p_2}$.

(4) a. own-price elasticity of demand = -1.
Justification: $\varepsilon = \frac{\partial q_1^*}{\partial p_1}\frac{p_1}{q_1} = \frac{5(-1)p_1^{-2}p_2^{0.1}I\ p_1}{5p_1^{-1}p_2^{0.1}I} = -1$,
Or give the rule of thumb: "This is a power function, so the exponent of p_1 is the own-price elasticity of demand."
b. $5\ (a\ p_1)^{-1}\ (a\ p_2)^{0.1}\ (aI) = a^{-1}\ a^{0.1}\ a\ 5\ p_1^{-1}\ p_2^{0.1}\ I = a^{0.1}\ 5\ p_1^{-1}\ p_2^{0.1}\ I$.
Since the a factors do not cancel out, this function is NOT homogeneous of degree zero in income and prices.

IV. CRITICAL THINKING

(1) Anna will prefer an *increase in price* from $3.50 to $4.
Justification with demand curve diagram: The data given in the problem imply that Anna's demand curve for gasoline passes through the point ($3.50, 20 gallons), as shown in the graph below.



If the price of gasoline rises from \$3.50 to \$4.00, Anna's loss of consumer surplus is the area of the shaded trapezoid. We cannot evaluate this area because we do not know how much gasoline Anna would demand at a price of \$4.00. However, she would surely demand less than 20 gallons (by the Law of Demand). So the area of the trapezoid must be less than the area of the rectangle, which is \$10. Since the loss of consumer surplus would be less than \$10, Anna would prefer an increase of \$0.50 in the price of gasoline to a decrease of \$10 in her monthly income.

(2) All three of Brian's COL indices increase at the *same rate*.
Justification with algebraic proof:

By definition, Brian's Laspeyres COL index $= \frac{p_b^{new} q_b^{old} + p_f^{new} q_f^{old}}{p_b^{old} q_b^{old} + p_f^{old} q_f^{old}} \times 100$.

By definition, Brian's Paasche COL index $= \frac{p_b^{new} q_b^{new} + p_f^{new} q_f^{new}}{p_b^{old} q_b^{new} + p_f^{old} q_f^{new}} \times 100$.

But we are given that $2\, q_b^{old} = q_b^{new}$ and $2\, q_f^{old} = q_f^{new}$.

Substituting, Brian's Paasche COL index becomes

$$= \frac{p_b^{new} 2q_b^{old} + p_f^{new} 2q_f^{old}}{p_b^{old} 2q_b^{old} + p_f^{old} 2q_f^{old}} \times 100 = \frac{2}{2} \cdot \frac{p_b^{new} q_b^{old} + p_f^{new} q_f^{old}}{p_b^{old} q_b^{old} + p_f^{old} q_f^{old}} \times 100$$

$$= \frac{p_b^{new} q_b^{old} + p_f^{new} q_f^{old}}{p_b^{old} q_b^{old} + p_f^{old} q_f^{old}} \times 100 \quad .$$

Therefore Brian's Paasche and Laspeyres COL indices are identical.

By definition, Brian's Fisher COL index $= \sqrt{Laspeyres \times Paasche}$.

But since Brian's Paasche and Laspeyres COL indices are identical, we have

$Fisher = \sqrt{Laspeyres \times Paasche} = \sqrt{Laspeyres^2} = Laspeyres$.

Therefore, if $2\, q_b^{old} = q_b^{new}$ and $2\, q_f^{old} = q_f^{new}$, then all three COL indexes increase at the same rate.

Version B

I. MULTIPLE CHOICE

(1)a. (2)d. (3)a. (4)e. (5)b.

II. SHORT ANSWER

(1) a. inelastic b. increase c. 2% d. decrease e. 3%.
(2) a. necessary good b. increase c. 2% d. decrease e. 6%.
(3) a. -3/10 b. -6 c. \$40 d. -1 hamburgers
e. -5 hamburgers.
(4) a. \$12 b. 2 units c. \$6 d. 7 units e. 4 units f. 1 units.
(5) a. L=116 b. P=110 c. F = $\sqrt{116 \cdot 110} = 113.0$.
(6) a. worse off b. \$160 c. \$200 .

III. PROBLEMS

(1) a. -3/2 = -1.5 b. straight line with intercepts at sodapop=15 and other=10.

(2) a. $300 = 2 q_1 + 8 q_2$ b. MRSC = $\frac{2q_1}{q_2}$ c. $q_1^* = 50$, $q_2^* = 25$.

(3) a. MRSC = $\frac{q_1+5}{q_2}$ b. $q_1^* = \frac{I}{2p_1} - \frac{5}{2}$ $q_2^* = \frac{I}{2p_2} + \frac{5p_1}{2p_2}$.

(4) a. own-price elasticity of demand = -0.9.
Justification: $\varepsilon = \frac{\partial q_1^*}{\partial p_1}\frac{p_1}{q_1} = \frac{3(-0.9)p_1^{-1.9}p_2^{-0.2}I^{1.1}\ p_1}{3p_1^{-0.9}p_2^{-0.2}I^{1.1}} = -0.9$,
Or give the rule of thumb: "This is a power function, so the exponent of p_1 is the own-price elasticity of demand."
b. $3\,(a\,p_1)^{-0.9}\,(a\,p_2)^{-0.2}\,(aI)^{1.1} = a^{-0.9}\,a^{-0.2}\,a^{1.1}\,3\,p_1^{-0.9}\,p_2^{-0.2}\,I^{1.1} = a^0\,3\,p_1^{-0.9}\,p_2^{-0.2}\,I^{1.1}$.
Since the a factors cancel out, this function IS homogeneous of degree zero in income and prices.

IV. CRITICAL THINKING: Same as Version A.

Version C

I. MULTIPLE CHOICE

(1)c. (2)b. (3)f. (4)a. (5)c.

II. SHORT ANSWER

(1) a. elastic b. increase c. 7% d. increase e. 2%.
(2) a. necessary good b. decrease c. 6% d. increase e. 2%.
(3) a. -3/5 b. -10 c. \$50 d. -3 hamburgers
e. -7 hamburgers.
(4) a. \$5 b. 8 units c. \$15 d. 2 units e. 2 units f. 4 units.

(5) a. L=120 b. P=110 c. F = $\sqrt{120 \cdot 110} = 114.9$.
(6) a. better off b. \$140 c. \$130 .

III. PROBLEMS

(1) a. -5/4 = -1.25 b. straight line with intercepts at pizzas=25 and other=20.

(2) a. $150 = 6\ q_1 + 2\ q_2$ b. MRSC = $\frac{2q_1}{3q_2}$ c. $q_1^* = 15$, $q_2^* = 30$.

(3) a. MRSC = $\frac{q_1}{q_2 - 3}$ b. $q_1^* = \frac{I}{2p_1} - \frac{3p_2}{2p_1}$ $q_2^* = \frac{I}{2p_2} + \frac{3}{2}$.

(4) a. own-price elasticity of demand = -1.5.
Justification: $\varepsilon = \frac{\partial q_1^*}{\partial p_1}\frac{p_1}{q_1} = \frac{3(-1.5)p_1^{-2.5}p_2^{0.1}I^{1.2}\ p_1}{3p_1^{-1.5}p_2^{0.1}I^{1.2}} = -1.5$,
Or give the rule of thumb: "This is a power function, so the exponent of p_1 is the own-price elasticity of demand."
b. $3\ (a\ p_1)^{-1.5}\ (a\ p_2)^{0.1}\ (aI)^{1.2} = a^{-1.5}\ a^{0.1}\ a^{1.2}\ 3\ p_1^{-1.5}\ p_2^{0.1}\ I^{1.2} = a^{-0.2}\ 3\ p_1^{-1.5}\ p_2^{0.1}\ I^{1.2}$.
Since the a factors do not cancel out, this function is NOT homogeneous of degree zero in income and prices.

IV. CRITICAL THINKING: Same as Version A.

[end of answer key]