ECON 173 - Intermediate Microeconomic Analysis
Drake University, Fall 2019
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FINAL EXAMINATION ANSWER KEY

Version A

I. Multiple choice

(1)c. (2)d. (3)b. (4)c. (5)d. (6)b. (7)d. (8)b. (9)a. (10)e.
(11)b. (12)b. (13)c. (14)d. (15)b. (16)b. (17)b. (18)a. (19)d. (20)b.

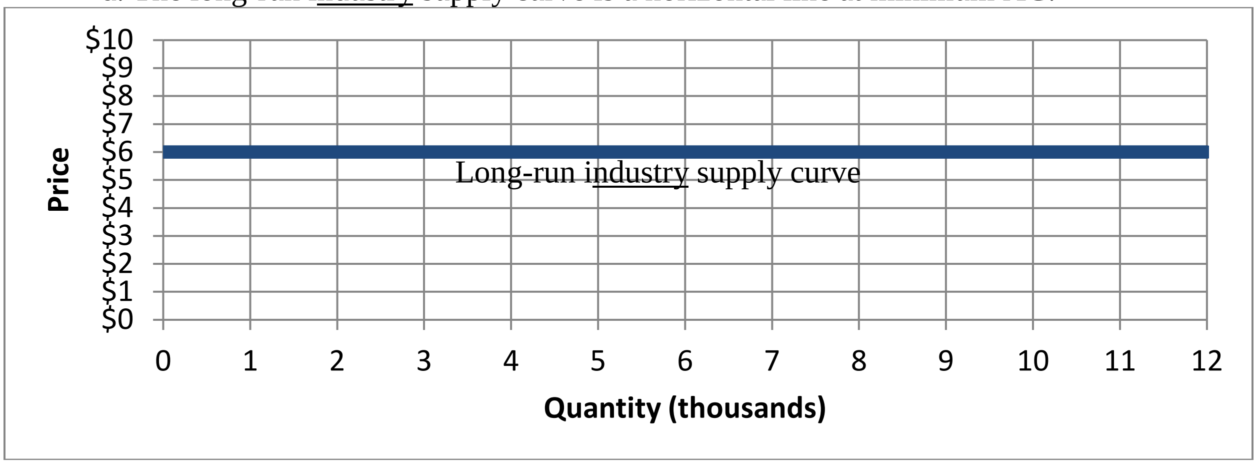
II. Short answer

(1) a. inelastic. b. decrease. c. 4 %.
d. increase. e. 1 %.
(2) a. $\varepsilon^{comp} = -1.16$. b. increase. c. 12.0 %.
d. 0.4 %. e. 11.6 %.
(3) a. 2 units. b. 6 units. c. $90.
d. 3 units. e. $95.
(4) a. $5. b. 5 thousand. c. $4 per pumpkin.
d. $7 per pumpkin. e. decrease. f. $6 thousand.
g. decrease. h. $12 thousand. i. $15 thousand.
j. $3 thousand.
(5) a. 4 units of food b. 1/4 units of clothing c. slope = -1/4
d. P_{food} = $3, because slope of each consumer's budget line = $-P_{food}/P_{clothing} = -1/4$.
(6) a. yes, yes. b. no, no. c. no, yes.
(7) a. no, no, yes, yes. b. no, no, no, no. c. no, no, yes, yes.
(8) a. Laspeyres = 140. b. Paasche = 130. c. $\sqrt{140 \times 130}$.
(9) a. Set MB = $5 and solve to get Q** = 3 flowers.
b. MSB = 5 × MB = 40 – 5 Q.
c. Set MSB = $5 and solve to get Q* = 7 flowers.

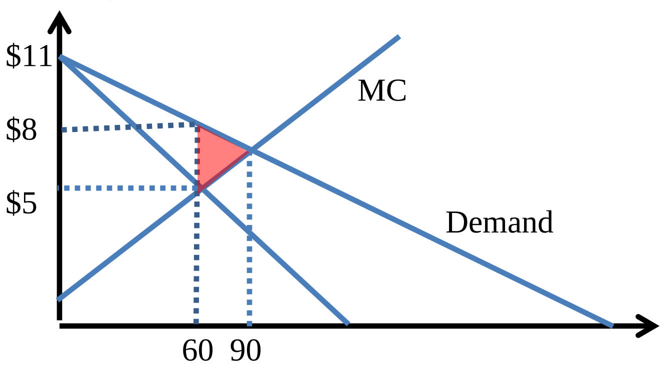
III. Problems

(1) [Finding individual demand functions]
a. $MRS = MU_2/MU_1 = (4\, q_1) / (q_2)$.
Solve $MRS = p_2/p_1$ jointly with $I = p_1 q_1 + p_2 q_2$ to get
b. $q_1^* = \dfrac{I}{5\, p_1}$, and c. $q_2^* = \dfrac{4\, I}{5\, p_2}$.
(2) [Long-run profit maximization and supply]
a. $AC = TC/q = 0.01\, q^2 - 0.4\, q + 10$.
Set $0 = dAC/dq = 0.02\, q - 0.4$ and solve to get $q_{ES} = 20$.
b. Breakeven price = minimum AC = $AC(q_{ES})$ = $6.
c. A supply curve shows how much will be produced for any given price. If P>minimum average cost, the profit-maximizing firm will choose an output level where P=MC(q), and

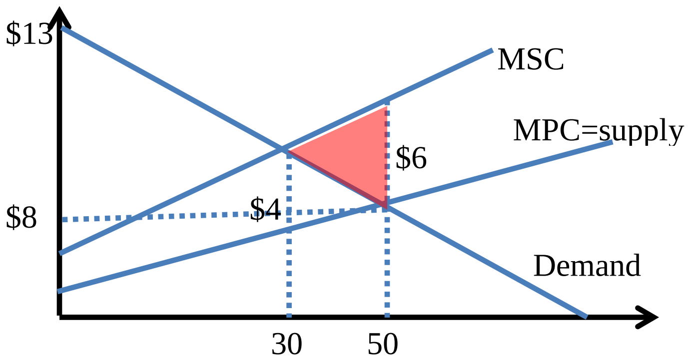
if P<minimum average cost, it will produce nothing. So the firm's supply curve is given by the following equations.
If $P \geq \$6$, $P = MC(q) = dTC/dq = 0.03\,q^2 - 0.8\,q + 10$.
If $P \leq \$6$, q=0 (firm shuts down).
d. The long-run industry supply curve is a horizontal line at minimum AC:



(3) [Monopoly, profit maximization]
a. $MC = dTC/dQ = 2 +$ **(Q/20).**
b. $AC = TC/Q = 2 +$ **(Q/40).**
c. First find total revenue = $P\times Q = 11Q - (Q^2/20)$. So MR = dTR/dQ = **11 – (2Q/20).**
d. Set MC = MR and solve to get Q_M = **60**.
e. Substitute into demand function: $P_M = 11 - (60/20)$ = **$8**.
f. Profit = TR – TC = $(60\times8) - [60\times2 + (60^2/40)]$ = **$270**.
g. The efficient level of output lies where marginal cost intersects demand ("marginal cost pricing"). Find this quantity by setting 11 – (Q/20) = 2 +(Q/20), which yields Q=90. Then find MC(60) = 2 + (60/20) = $5. Then evaluate DWL as the area of a triangle: **$45.**



(4) [External cost and Pigou tax]
a. Set $P_D = P_S$ and solve to get Q** = 50, P = $8.
b. MSC = P_S + MEC = 4 + (2Q/10).
c. Set MSC = P_D and solve to get Q* = 30.
d. DWL = (1/2) × (50-30) × 6 = $60.
e. Pigou tax rate = MEC(30) = $4.



(5) [Uncertainty, risk aversion, demand for insurance.]
a. E(W) = (0.50 × 25) + (0.50 × 9) = $17 .
b. E(U) = $(0.50 \times 25^{1/2}) + (0.50 \times 9^{1/2})$ = 4 utils.
c. Set U(W) = $W^{1/2}$ = 4 and solve to get W* = $16 .
d. Willing to pay $25 - $16 = $9.
e. Fair insurance premium = 0.50 × $16 = $8 .

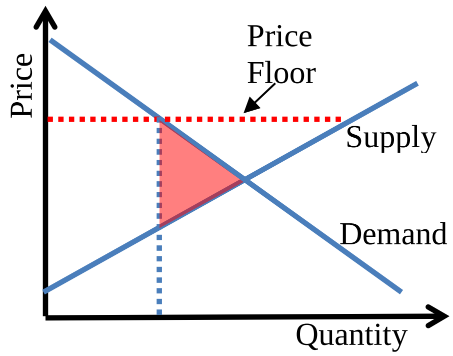
(6) [Hidden characteristics and adverse selection]
a. P_D = 20 + EL = 420 – 0.2 Q.
b. MC = EL = 400 – 0.2 Q.
c. If the market were efficient, everyone (Q=1000) would get insurance because everyone is willing to pay more than the marginal cost of insurance: P_D > MC for all values of Q.
d. AC = 400 – 0.1 Q.
e. Set P_D = AC and solve to get Q = 200. P = AC(200) = $380.

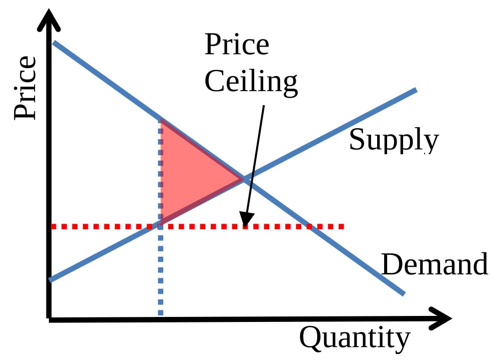
IV. Essay

A good answer should recognize that this question is about **price floors** (legal minimum prices) and **price ceilings** (legal maximum prices). It should acknowledge that the first two statements regarding consumer and producer surplus are usually correct.

However, the statement that price floors and price ceilings do not affect total social welfare is incorrect. Both price floors and price ceilings **decrease the quantity traded and therefore create deadweight loss**. Put differently, the increase in producer surplus from a price floor is less than the decrease in consumer surplus. Similarly, the increase in consumer surplus from a price ceiling is less than the decrease in producer surplus.

Full credit requires supply-and demand graphs that support this answer. Graphs should show that a price floor or price ceiling decreases the quantity traded and creates a triangle of deadweight loss. (See the slideshow “Welfare analysis of Price Controls and Quotas.”)





Version B

I. Multiple choice

(1)b. (2)e. (3)c. (4)d. (5)b. (6)b. (7)c. (8)a. (9)e. (10)b.
(11)a. (12)d. (13)b. (14)d. (15)e. (16)a. (17)d. (18)c. (19)b. (20)d.

II. Short answer

(1) a. elastic. b. decrease. c. 6 %.
d. decrease. e. 3 %.

(2) a. $\varepsilon^{comp} = -0.34$. b. decrease. c. 4.0 %.
d. 0.6 %. e. 3.4 %.

(3) a. 6 units. b. 2 units. c. $90.
d. 7 units. e. $135.

(4) a. $5. b. 9 thousand. c. $6 per pumpkin.
d. $3 per pumpkin. e. increase. f. $8 thousand.
g. increase. h. $16 thousand. i. $27 thousand.
j. $3 thousand.

(5) a. 3 units of food b. 1/3 units of clothing c. slope = -1/3
d. P_{food} = $4, because slope of each consumer's budget line = $-P_{food}/P_{clothing} = -1/3$.

(6) a. no, no. b. no, yes. c. yes, yes.

(7) a. no, yes, no, yes. b. no, no, no, no. c. no, no, no, yes.

(8) a. Laspeyres = 160. b. Paasche = 150. c. $\sqrt{160 \times 150}$.

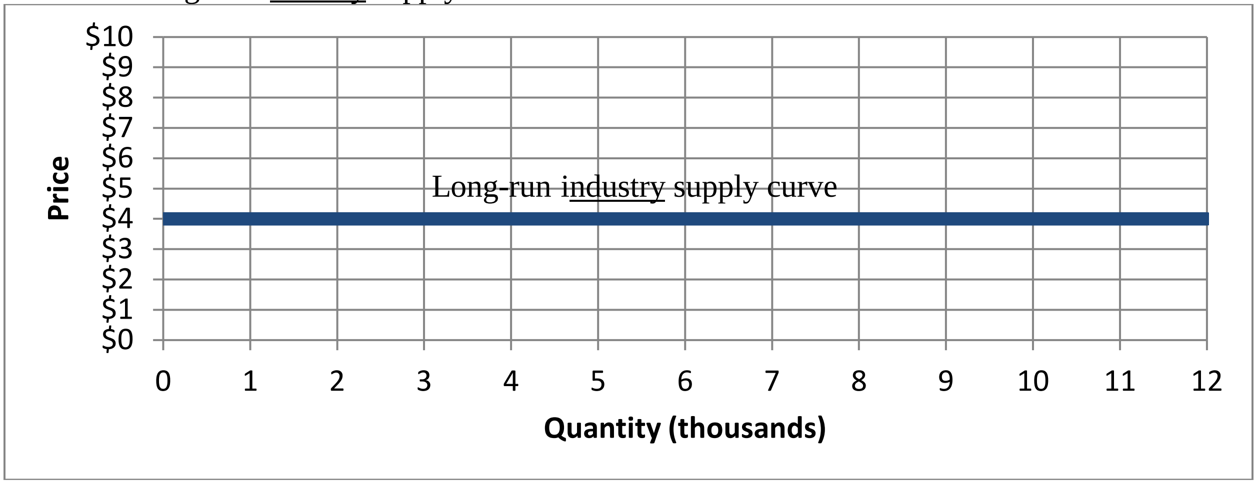
(9) a. Set MB = $5 and solve to get Q** = 1 flowers.
b. MSB = 5 × MB = 30 – 5 Q.
c. Set MSB = $5 and solve to get Q* = 5 flowers.

III. Problems

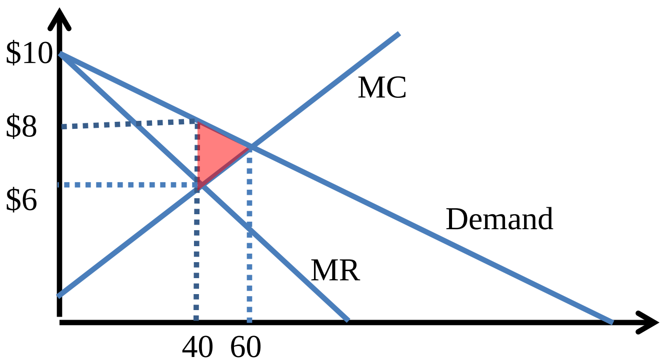
(1) [Finding individual demand functions]
a. $MRS = MU_2/MU_1 = (3q_1) / (2q_2)$.
Solve $MRS = p_2/p_1$ jointly with $I = p_1q_1 + p_2q_2$ to get
b. $q_1^* = \frac{2\,I}{5\,p_1}$, and c. $q_2^* = \frac{3\,I}{5\,p_2}$.

(2) [Long-run profit maximization and supply]

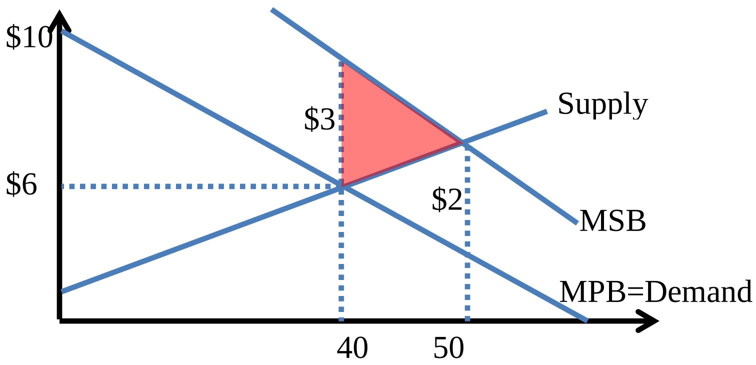
a. AC = TC/q = $0.01\,q^2 - 0.2\,q + 5$.
Set $0 = dAC/dq = 0.02\,q - 0.2$ and solve to get $q_{ES} = 10$.
b. Breakeven price = minimum AC = AC(q_{ES}) = \$4.
c. A supply curve shows how much will be produced for any given price. If P>minimum average cost, the profit-maximizing firm will choose an output level where P=MC(q), and if P<minimum average cost, it will produce nothing. So the firm's supply curve is given by the following equations.
If $P \geq \$4$, P = MC(q) = dTC/dq = $0.03\,q^2 - 0.4\,q + 5$.
If $P \leq \$4$, q=0 (firm shuts down).
d. Long-run industry supply curve is a horizontal line at minimum AC:



(3) [Monopoly, profit maximization]
a. MC = dTC/dQ = **4 + (Q/20).**
b. AC = TC/Q = **4 + (Q/40).**
c. First find total revenue = P×Q = 10Q – (Q^2/20). So MR = dTR/dQ = **10 – (2Q/20).**
d. Set MC = MR and solve to get Q_M = **40**.
e. Substitute into demand function: P_M = 10 – (40/20) = **\$8**.
f. Profit = TR – TC = (40×8) – (4×40 + 40^2/40) = **\$120**.
g. The efficient level of output lies where marginal cost intersects demand ("marginal cost pricing"). Find this quantity by setting 10 – (Q/20) = 4 + (Q/20), which yields Q=60. Then find MC(40) = 4 + (40/20) = \$6. Then evaluate DWL as the area of a triangle: **\$20.**



(4) [External benefit and Pigou subsidy]
a. Set $P_D = P_S$ and solve to get Q** = 40, P = $6.
b. MSB = P_D + MEB = 17 – (2Q/10).
c. Set MSB = P_S and solve to get Q* = 50.
d. DWL = (1/2) × (50-40) × 3 = $15.
e. Pigou subsidy rate = MEB(50) = $2.



(5) [Uncertainty, risk aversion, demand for insurance.]
a. E(W) = (0.50 × 16) + (0.50 × 4) = $10 .
b. E(U) = $(0.50 \times 16^{1/2}) + (0.50 \times 4^{1/2})$ = 3 utils.
c. Set U(W) = $W^{1/2}$ = 3 and solve to get W* = $9 .
d. Willing to pay $16 - $9 = $7.
e. 0.50 × $12 = $6 .

(6) [Hidden characteristics and adverse selection]
a. P_D = 40 + EL = 340 – 0.1 Q.
b. MC = EL = 300 – 0.1 Q.
c. If the market were efficient, everyone (Q=1000) would get insurance because everyone is willing to pay more than the marginal cost of insurance: P_D > MC for all values of Q.
d. AC = 300 – 0.05 Q.
e. Set P_D = AC and solve to get Q = 800. P = AC(800) = $260.

IV. Short Essay

Same as version A.

[end of answer key]