

EXAMINATION #4 ANSWER KEY

Version A

I. MULTIPLE CHOICE

(1)e. (2)a. (3)c. (4)a. (5)e. (6)b. (7)b. (8)d. (9)a. (10)b. (11)b. (12)c.

II. SHORT ANSWER

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|-----|-------------|--------------------------|---------------------|
| (1) | a. 70 units | b. 30 units | c. \$8. |
| (2) | a. decrease | b. 150 units other goods | c. 1/5 units energy |
| | d. -5 | e. \$10. | |
| (3) | a. \$1.75 | b. decrease | c. \$0.25. |
| (4) | a. \$30 | b. \$18. | |
| (5) | a. 0.50 | b. 0.10 | c. 0.025. |
| (6) | a. curve C | b. 60 units | c. \$7. |
| | d. \$0. | | |

III. PROBLEMS

- (1) a. $MRS_X = \frac{q_{1X}}{q_{2X}}$. b. $MRS_Y = \frac{q_{1Y}}{3 q_{2Y}}$

Allocation C is efficient because $MRS_X = MRS_Y$ and all available goods are consumed.

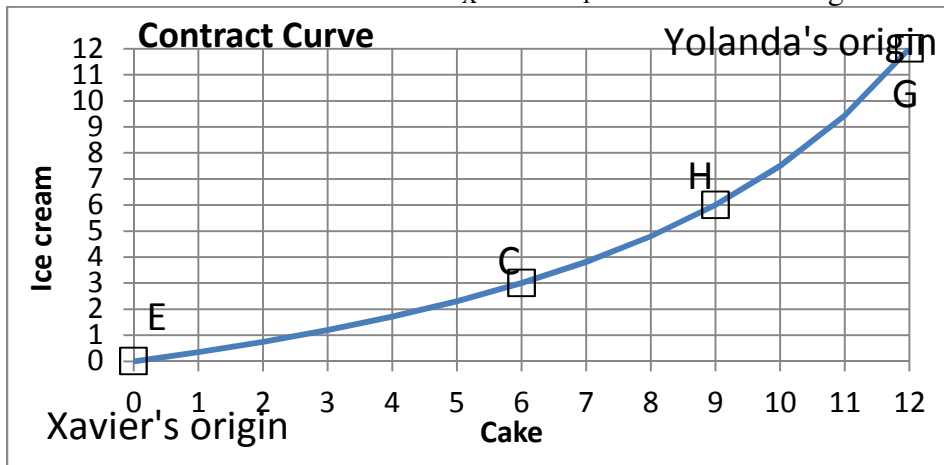
Allocation D is inefficient because $MRS_X \neq MRS_Y$.

Allocation E is efficient because even though Xavier has nothing, one cannot make Xavier better off without making Yolanda worse off, and one cannot make Yolanda better off in any case.

Allocation F is inefficient because not all available goods are consumed.

Allocation G is efficient because even though Yolanda has nothing, one cannot make Yolanda better off without making Xavier worse off, and one cannot make Xavier better off in any case.

Allocation H is efficient because $MRS_X = MRS_Y$ and all available goods are consumed.



i.

- (2) a. $MR = 15 - (2Q/10,000)$. Set $MR = MC$ and solve to get $Q_M=50,000$, $P_M=\$10$.
 b. Revenue – production cost = \$500,000 - \$250,000 = \$250,000.
 c. Competition would result in $P = MC = \$5$. Inserting this into the demand curve yields $Q = 100,000$.
 d. $DWL = \$125,000$.
- (3) a. $Rev_1 = 20q_1 - \frac{q_1^2}{10} - \frac{q_1q_2}{10}$. b. $MR_1 = 20 - \frac{2q_1}{10} - \frac{q_2}{10}$.
 c. Set $MR_1 = MC = 2$ and solve to get $q_1 = 90 - \frac{q_2}{2}$.
 d. Substitute $q_2 = q_1$ and solve to get $q_1 = 60$.
 e. $Q = q_1 + q_2 = 120$ and $P = 20 - (120/10) = \$8$.
 f. Profit = revenue – cost = $PQ - ACQ = \$720$.
 g. Efficient output level ($P=MC$) is 180, so $DWL = (1/2)(8-2)(180-120) = \180 .

IV. CRITICAL THINKING

- (1) *Monopoly with constant-elasticity demand:*
 $Rev = PQ = 12Q^{0.5}$ so $MR = dRev/dQ = 6Q^{-0.5}$.
 Set $MR = MC = 2$ and solve to get $Q = \boxed{9}$.
 Substitute into demand equation to get $P = 12Q^{-0.5} = 12(9)^{-0.5} = \boxed{\$4}$.
 Profit = revenue – cost = $PQ - ACQ = \boxed{\$18}$.
- (2) *Cournot triopoly:*
 $P = 15 - \frac{q_1+q_2+q_3}{100}$, so $Rev_1 = Pq_1 = 15q_1 - \frac{q_1^2+q_1q_2+q_1q_3}{100}$.
 So $MR_1 = \frac{\partial Rev_1}{\partial q_1} = 15 - \frac{2q_1}{100} - \frac{q_2}{100} - \frac{q_3}{100}$.
 Set $MR_1 = MC = 3$ and solve to get reaction function $q_1 = 600 - \frac{q_2}{2} - \frac{q_3}{2}$.
 Since each firm has same marginal cost, this is a *symmetric* triopoly: $q_1 = q_2 = q_3$.
 Solve $q_1 = 600 - \frac{q_1}{2} - \frac{q_1}{2}$ to get $\boxed{q_1 = 300}$.
 $Q = q_1 + q_2 + q_3 = 300 + 300 + 300 = 900$.
 Substituting into demand equation: $P = 15 - (900/100) = \boxed{\$6}$.

Version B

I. MULTIPLE CHOICE

- (1)b. (2)b. (3)b. (4)b. (5)b. (6)a. (7)d. (8)b. (9)b. (10)c. (11)c. (12)d.

II. SHORT ANSWER

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|-----|-----------------------|--------------------------|----------------------------|
| (1) | a. 40 units | b. 60 units | c. \$9. |
| (2) | a. decrease | b. 180 units other goods | c. 1/6 units energy |
| | d. -6 | e. \$12. | |
| (3) | a. \$3.95 | b. increase | c. \$0.95. |
| (4) | a. \$40 | b. \$24. | |
| (5) | a. $\frac{1}{4}=0.25$ | b. $\frac{1}{20}=0.05$ | c. $\frac{1}{80}=0.0125$. |
| (6) | a. curve B | b. 40 units | c. \$9. |
| | d. \$0. | | |

III. PROBLEMS

(1) a. $MRS_X = \frac{q_{1X}}{2 q_{2X}}$. b. $MRS_Y = \frac{q_{1Y}}{q_{2Y}}$

Allocation C is inefficient because $MRS_X \neq MRS_Y$.

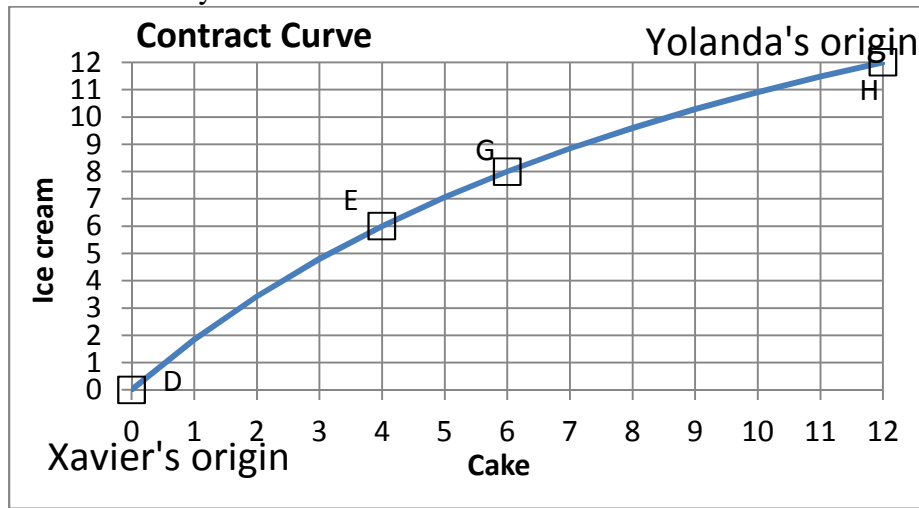
Allocation D is efficient because even though Xavier has nothing, one cannot make Xavier better off without making Yolanda worse off, and one cannot make Yolanda better off in any case.

Allocation E is efficient because $MRS_X = MRS_Y$ and all available goods are consumed.

Allocation F is inefficient because not all available goods are consumed.

Allocation G is efficient because $MRS_X = MRS_Y$ and all available goods are consumed.

Allocation H is efficient because even though Yolanda has nothing, one cannot make Yolanda better off without making Xavier worse off, and one cannot make Xavier better off in any case.



i.

- (2) a. $MR = 30 - (Q/1,000)$. Set $MR = MC$ and solve to get $Q_M=20,000$, $P_M=\$20$.
 b. Revenue – production cost = $\$400,000 - \$200,000 = \$200,000$.
 c. Competition would result in $P = MC = \$10$. Inserting this into the demand curve yields $Q = 40,000$.
 d. $DWL = \$100,000$.

- (3) a. $Rev_1 = 20q_1 - \frac{q_1^2}{10} - \frac{q_1q_2}{10}$. b. $MR_1 = 20 - \frac{2q_1}{10} - \frac{q_2}{10}$.
 c. Set $MR_1 = MC = 5$ and solve to get $q_1 = 75 - \frac{q_2}{2}$.
 d. Substitute $q_2 = q_1$ and solve to get $q_1 = 50$.
 e. $Q = q_1 + q_2 = 100$ and $P = 20 - (100/10) = \$10$.
 f. Profit = revenue – cost = $P Q - AC Q = \$500$.
 g. Efficient output level ($P=MC$) is 150, so $DWL = (1/2) (10-5) (150-100) = \125 .

IV. CRITICAL THINKING (Same as Version A.)

[end of answer key]