Economic Analysis for Business
Economics 815

Solutions to Final Examination

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I Short Answer

1. $\frac{P-\bar{C}}{P} = \frac{H}{E_p} = \frac{H}{b} \Rightarrow \frac{8-6}{8} = \frac{1}{2b} \Rightarrow \boxed{b=2}$

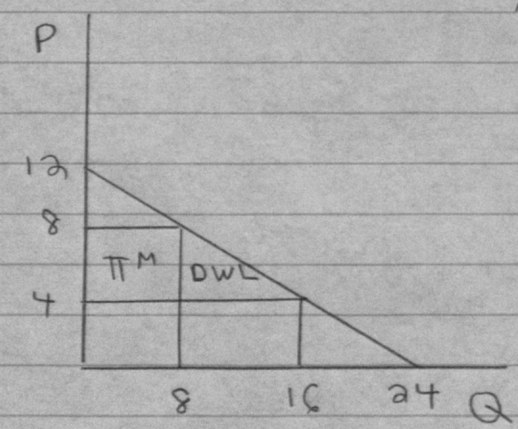
2. (1) Perfect Competition $\equiv$ Bertrand Duopoly
   (2) Cournot Duopoly
   (3) Monopoly
   (4) First-Degree Price Discrimination

3. $\pi_2 = [20-4][4-C_2] = 48 \Rightarrow 4-C_2 = 3 = C_2 = 1.$

4 $P^M = MC\left(\frac{-Ed}{-Ed-1}\right)$. when $\alpha = 0$, $Q_1 = 100P_1^{-2}$ and $Q_2 = 50P_2^{-3} \Rightarrow$ $P_1^M = 4(2/2-1) = 8$ and $P_2^M = 2(3/3-1) = 3$. When $\alpha < 0$, we have complements and $P_1^M < 8$ and $P_2^M < 3$. This occurs because, in the case of complements, a higher price for good 1 (2) reduces demand for good 2 (1).

5. $Q = 24 - 2P \Rightarrow P = 12 - \frac{1}{2}Q$

Monopoly: $MR = MC \Rightarrow 12 - Q = 4$
$\Rightarrow Q^M = 8$
$\Rightarrow P^M = 8$



$DWL = \frac{1}{2}(16-8)(8-4) = \boxed{16}$

$\pi^M = 8 \times 4 = 32$

Under Monopoly, $CS^M = \frac{1}{2}(8)(12-8) = 16$
Under Competition, $CS^C = \frac{1}{2}(16)(12-4) = 64$
If bribe monopolist to price at competitive level,

Net $CS = 64 - 32 = 32 > 16$. Consumers are better off by 16 in this scenario.

6. $P = 30 - 2Q$; Post-Merger Cost Function: $C(Q) = 2Q$

Monopoly: $MR = MC$

$$30 - 4Q = 2 \implies Q^M = 7$$
$$P^M = 16$$

Competitive: $P = MC \implies$

$$\boxed{C = 16}$$

II. Problems

1. [Merger Analysis] $Q = 36 - 2P + S$

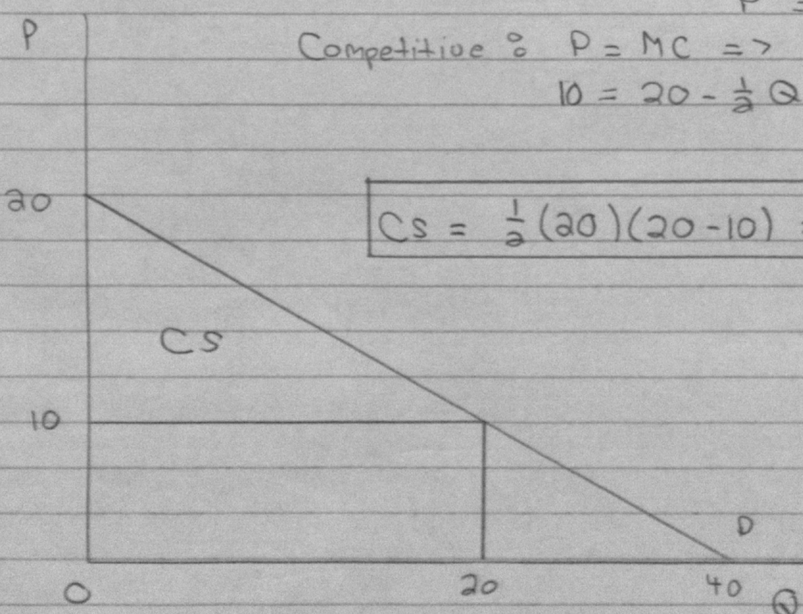
$C(Q) = 10Q$ Pre-Merger Cost Function

$S = 4$ Pre-Merger $C(Q) = 10\theta Q$ Post-Merger Cost Function; $\theta < 1$.

a) With $S = 4$, $Q = 36 - 2P + 4 \implies Q = 40 - 2P \implies$
$P = 20 - \frac{1}{2}Q$

Competitive: $P = MC \implies$
$10 = 20 - \frac{1}{2}Q \implies \boxed{Q^C = 20, \; P^C = 10}$

$$\boxed{CS = \frac{1}{2}(20)(20-10) = 100}$$



b) With $\theta = \frac{4}{5}$, $C(Q) = \frac{10 \times 4}{5} Q = 8Q$

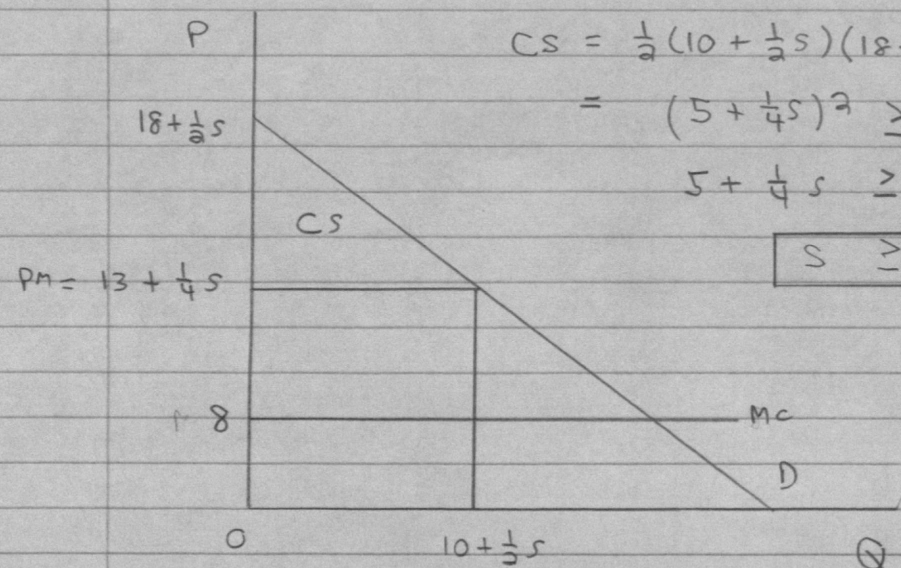
Monopoly: $Q = 36 - 2P + S$
$Q - 36 - S = -2P \implies P = (18 + \frac{1}{2}S) - \frac{1}{2}Q$

Set $MR = MC$

(1) $\left(18 + \frac{1}{2}S\right) - Q = 8 \Rightarrow$

$Q^M = 10 + \frac{1}{2}S$

$P^M = 18 + \frac{1}{2}S - \frac{1}{2}\left(10 + \frac{1}{2}S\right) = 13 + \frac{1}{4}S$



$CS = \frac{1}{2}\left(10 + \frac{1}{2}S\right)\left(18 + \frac{1}{2}S - 13 - \frac{1}{4}S\right)$

$= \left(5 + \frac{1}{4}S\right)^2 \geq 100$

$5 + \frac{1}{4}S \geq 10$

$\boxed{S \geq 20}$

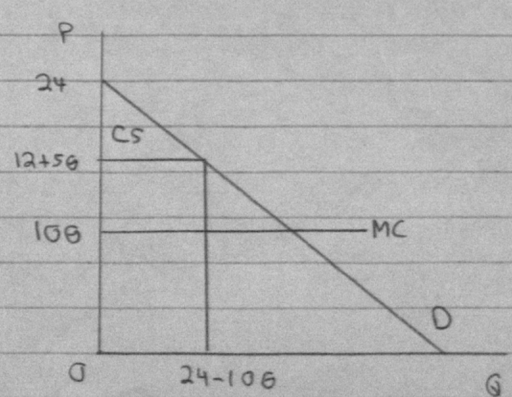
Alternatively, choose S such that $Q^M \geq 20$

c) $S = 12 \Rightarrow Q = 36 - 2P + 12 \Rightarrow Q = 48 - 2P \Rightarrow$
$P = 24 - \frac{1}{2}Q$

Monopoly; Set $MR = MC$

(2) $24 - Q = 10\theta \Rightarrow Q^M = 24 - 10\theta$

$P^M = 24 - \frac{1}{2}(24 - 10\theta) = 12 + 5\theta$



$CS = \frac{1}{2}(24 - 10\theta)(24 - 12 - 5\theta)$

$= (12 - 5\theta)^2 \geq 100$

$12 - 5\theta \geq 10$

$2 \geq 5\theta \Rightarrow$

$\boxed{\theta \leq \frac{2}{5}}$

Alternatively, choose θ such that $Q^M \geq 20$

2. Price Discrimination

a) $P^M = 180$ $\quad \pi^M = 2 \times [180-20] = 320$

$CS = 200-180 + 180-180 = 20$

b) $\pi = 200+180+100+40+30 = 550-(5+20) = 450$

$CS = 0$; $DWL = 0$

c) $5 \times (30-20) = 50$

d) $P^B = 180$; $P^T = 100$; $P^S = 30$

e) First Compute Bosco's Profits Under Third-Degree Price Discrimination:

$\pi = 2 \times [180-20] + 1 \times [100-20] + 1 \times [30-20] = 410$

If Bosco enters the market if allowed to practice Third-Degree Price Discrimination, but does not enter if constrained to practice uniform monopoly pricing, then

$320 < S \leq 410$

In other words, Bosco cannot generate non-negative profits under uniform monopoly pricing, but can generate non-negative profits if allowed to practice price discrimination.

3. Cournot Oligopoly

$P = 36 - 2Q$; $Q = q_1 + q_2$; $C(q_1) = 4q_1$; $C(q_2) = 4q_2$.

a) Derive the Reaction Functions: Set $MR_i = MC_i$, $i = 1, 2$

(1) $36 - 2q_2 - 4q_1 = 4 \Rightarrow 32 - 2q_2 = 4q_1$

Firm 1's Reaction Fct. $\Rightarrow R_1(q_2) = 8 - \frac{1}{2}q_2$

(2) $36 - 2q_1 - 4q_2 = 8 \Rightarrow 28 - 2q_1 = 4q_2$

Firm 2's Reaction Fct. $R_2(q_1) = 7 - \frac{1}{2}q_1$

b) Solve $R_1(q_2)$ and $R_2(q_1)$ simultaneously

Solving $R_1(q_2)$ for q_2, obtain

(3) $q_2 = 16 - 2q_1 = 7 - \frac{1}{2}q_1$

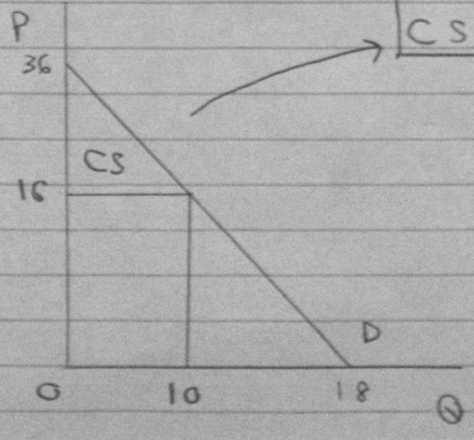
$9 = \frac{3}{2}q_1 \Rightarrow \boxed{q_1^* = 6}$

(4) $R_2(q_1^* = 6) = 7 - \frac{1}{2}(6) \Rightarrow \boxed{q_2^* = 4}$

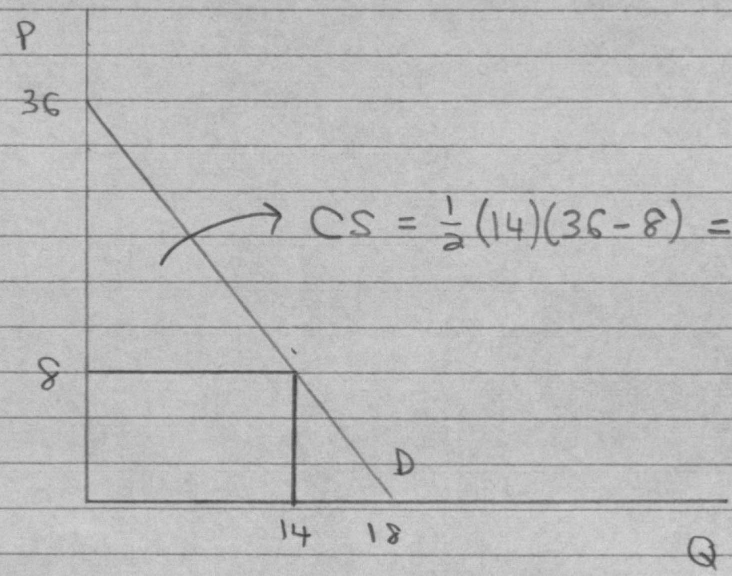
$q_1 + q_2 = \boxed{Q = 10}$

$\boxed{P(10) = 36 - 2(10) = 16}$

$\boxed{CS = \frac{1}{2}(10)(36-16) = 100}$



C) If the two firms play Bertrand rather than Cournot, the Nash Equilibrium price is 8. With P is 8, Q is 14 and consumers' surplus is given by approximately



$CS = \frac{1}{2}(14)(36-8) = 196$

Under the Cournot outcome, CS = 100. Hence, consumers are better off in the Bertrand equilibrium by 196 − 100 = + 96.

It follows that consumers would be willing to pay up to 96 to have these two firms compete ala Bertrand rather than Cournot.