



Microeconomics
Second Midterm

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10-11.30pm

Warnings

1. Calculators or any other electronic devices are not allowed.
2. No questions are answered during the test.
3. Please state on the test sheet anything that was not clear for you.

Honor's Commitment

I declare that I will neither use nor contribute, directly or indirectly, to any illegal procedure or fraud during this test.

Signature: Solutions

Good Luck!

Grade

Part I:

Part II:

Part III:

Name: _____ Nº: _____

I
(6)

The demand for gasoline is $P = 100 - 5Q^d$ and the supply is $P = 30 + 2Q^s$, where P in euros and Q in litres. Imagine that a tax of 7€/litre is placed on gasoline.

(i) What is the incidence of the tax? Illustrate graphically.

Before Tax Eq'm:

$$100 - 5Q = 30 + 2Q$$

$$\Rightarrow Q^* = 10$$

$$P^* = 50$$

After Tax Eq'm:

$$P^c = P^p + T$$

price consumer price producer tax

Rewriting Demand:

$$P^p + T = 100 - 5Q^d$$

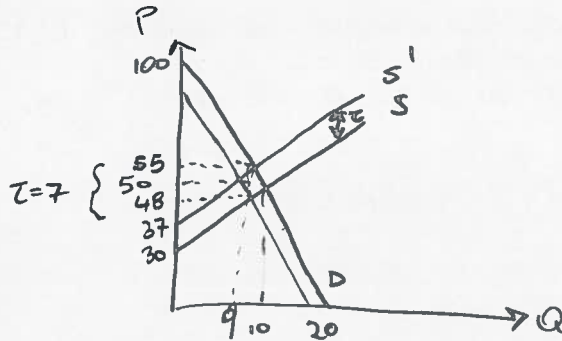
$$\Rightarrow P^p = 93 - 5Q^d$$

$$Q^d = Q^s$$

$$93 - 5Q^s = 30 + 2Q^s$$

$$\Rightarrow Q^* = 9$$

$$P^p = 48 \Rightarrow P^c = 55$$

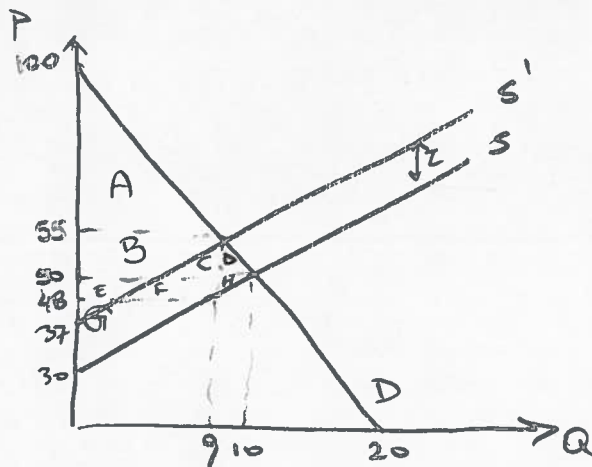


Common mistake:

* Adding tax to the eq'm (before tax) price.

Note: Tax effects both consumers and producers depending on the price elasticities.

(ii) What is the change consumer surplus? Compute it and illustrate graphically.



$$CS_I = A + B + C + D = \frac{(100 - 50) \cdot 10}{2} = 250$$

$$CS_F = \frac{(100 - 55) \cdot 9}{2} = 202,5$$

$$= A$$

$$\Delta CS = -47,5 = CS_F - CS_I$$

(iii) What is the change producer surplus? Compute it and illustrate graphically.

See the graph on (ii)

$$PS_I = E + F + H + G = \frac{(50-30)10}{2} = 100$$

$$PS_F = G = \frac{(48-30)9}{2} = 81$$

$$\Delta PS = -19$$

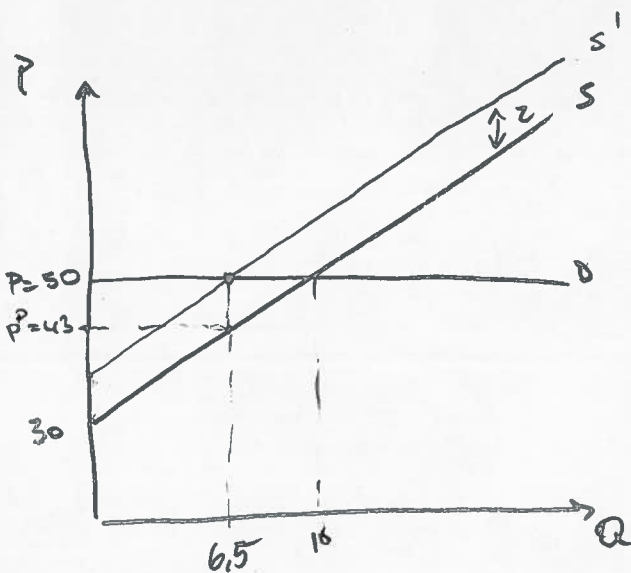
Common mistake:

* Thinking "B" is also part of the PS.

(iv) Imagine now that demand is perfectly elastic at $P=50$. How would your answers to the previous questions change? Calculate the pre-tax equilibrium, the post-tax equilibrium, as well as the changes in the producer and consumer surpluses. Illustrate graphically.

Before Tax Eqm: $P^* = 50$
 $Q^* = 10$

After Tax Eqm: $P^P + Z = 50 = P^C \Rightarrow P^P = 43 \Rightarrow Q^* = 6.5$



$$CS_I = CS_C = 0 = \Delta CS$$

$$PS_I = \frac{(50-30)10}{2} = 100$$

$$PS_R = \frac{(43-30) \cdot 6.5}{2} = 6.5^2 = 42.25$$

$$\Delta PS = -57.75$$

II
(4)

You are living in a world where people consume a normal good and live for 2-periods. One day in the second period, a friend of yours comes and tells you that he decided to save less after the interest rate increased. Do you think he was saved or borrowed in the first period? Justify your arguments graphically or analytically.

Slutsky Eq'n:

$$\frac{dc_1}{dr} = \underbrace{\frac{dc_1}{dr}}_{SE} + \underbrace{(m_1 - c_1)}_{IE} \underbrace{\frac{dc_1}{dM}}_{(+)}$$

The good is normal.

(-)

Saving: $s = m_1 - c_1$
 $s \downarrow \Rightarrow c_1 \uparrow$

If $m_1 < c_1$ (borrower) $\Rightarrow \frac{dc_1}{dr} < 0 \Rightarrow$ My friend couldn't be a borrower before the $r \uparrow$ in the first period.

If $m_1 > c_1$ (lender/saver) $\Rightarrow \frac{dc_1}{dr} > 0 \Rightarrow$ My friend has to be a lender, since it is possible to increase c_1 , so $s \downarrow$ after $r \uparrow$.

Common mistakes:

* Trying to justify by only mentioning the change in the inter-temporal budget constraint.

Question: Since we talk about my friend's optimal choice, can you justify it with only Inter-temporal BC? What about preferences?

* Considering more than 2-periods. No saving exists in the last period.

III
(10)

Imagine that you are the manager of a small competitive firm that produces nails in a market where all the firms are similar, and your total cost curve is given by:

$$TC = 8 + 2q + 2q^2$$

where q represents the amount of nails produced.

- (i) If $q=4$ is the optimal quantity of nails for the installed capacity of your firm, what is the price of nails in the market?

Firm produces at $P = MC(q)$

$$P = 2 + 4q, \quad q^* = 4 \Rightarrow P^* = 18$$

- (ii) Given (i), if market demand is given by

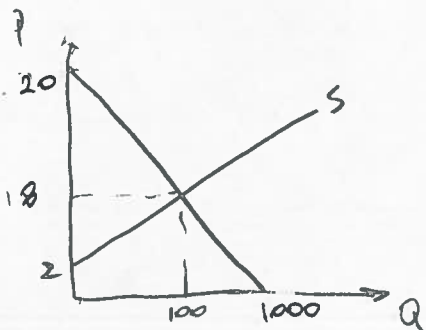
$$Q^d = 1000 - 50P$$

How much is produced in the market, and how many firms are competing with yours? Illustrate graphically the solution.

$$Q^d(P^*) = 1000 - 50 \cdot 18 = 100$$

Since each firm produces $q^* = 4$, $\Rightarrow n = \frac{Q^*}{q^*} = \frac{100}{4} = 25$

number of
firms



Firm's Supply: $P = MC(q) \Leftrightarrow P = 2 + 4q \Leftrightarrow q = \frac{P-2}{4}$

$$q^s = \begin{cases} \frac{P-2}{4} & \text{if } P \geq 2 \\ 0 & \text{if } P < 2 \end{cases}$$

$$Q^s = nq^s = \begin{cases} \frac{25P-50}{4} & \text{if } P \geq 2 \\ 0 & \text{if } P < 2 \end{cases}$$

$n=25$

- (iii) Based on the results obtained in (i), is this an equilibrium for your firm? And for the market, assuming that all firms are similar? Explain.

Firm is at the eq'm, since

- i) Producing at $P = MC(q)$
- ii) Making $\pi > 0$ (see below) or $P \geq \min AVC$ ($= 2$)

$$\pi = \underbrace{18 \times 4}_{72} - \underbrace{(8 + 8 + 32)}_{48} = 24 > 0$$

Market is not at the eq'm, because $\pi > 0$. More firms will enter in the eq'm, because $\pi > 0$ attracts other firms to make profit.

Common mistake:

* Confusing the problem for the firm and for the market.

Eq'm is the point, where there is no incentive to change anything.

- (iv) Imagine now that the industry is in long-run equilibrium. Given the total cost curve stated above, how much would your firm produce and at what price? Illustrate graphically.

In the LR eq'm: $P = \min AC(q)$

① $MC(q) = AC(q)$ or ② $\frac{dAC(q)}{dq} = 0$

① $\frac{8}{q} + 2 + 2q = 2 + 4q$

$\Leftrightarrow \frac{8}{q} = 2q$

$\Leftrightarrow 4 = q$

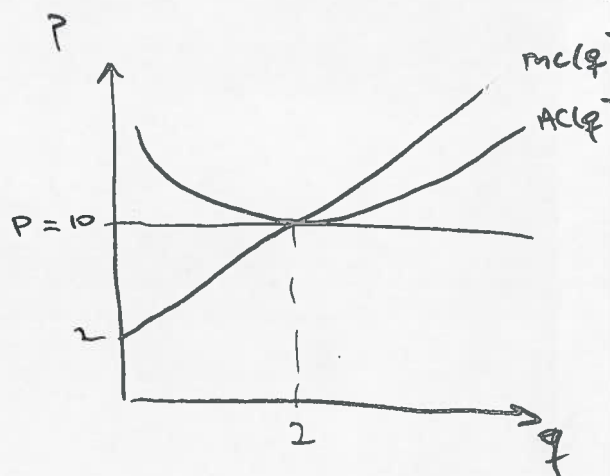
$\Leftrightarrow 2 = q^2$

② $\frac{dAC(q)}{dq} = 0$

$\Leftrightarrow -\frac{8}{q^2} + 2 = 0$

$\Leftrightarrow q^2 = 2$

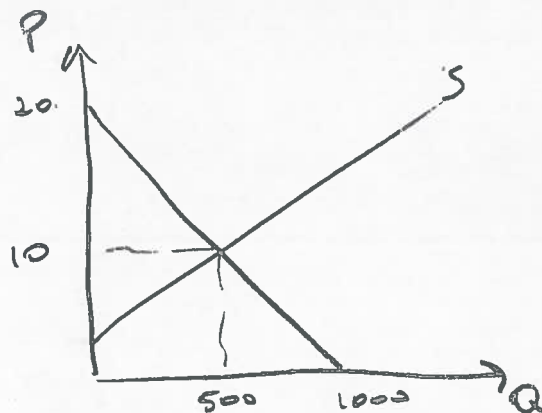
$P = \min AC(q) = AC(q=2) = 10$



- (v) If market demand is given as in (ii), how much is produced in the market, and how many firms are competing with yours? Illustrate graphically the solution.

At $P^* = 10$, $Q^D = 1000 - 50 \times 10 = 500$

$n^* = \frac{500}{2} = 250$



General Common Mistakes:

* Lots of simple calculation mistakes. Not able to see $\frac{63}{7} = 9$, and further complicate the calculations.

* Drawing irrelevant graphs / no graphs.

If the question ask you something about market, you should draw a graph for the firm, or vice-versa.