MICROECONOMICS 3
PROBLEMS #2

GOVERNMENT INTERVENTION

Problem #1

Analyse the changes in consumer surplus, producer surplus, government revenue, and deadweight loss in a purely competitive market for cigarettes, resulting from the introduction of a quantity tax of 20 zloty per each package sold. Present your analysis for three cases:

i. The inverse demand function is given by $P(Q) = 100 - Q$, while the inverse supply function is $P(Q) = 20 + Q$, where Q – quantity in thousands, P – price in zloty.
ii. Inverse demand function: $P(Q)=100 - Q$; inverse supply function: $P(Q) = 60$ ($a>c$).
iii. Inverse demand function: $P(Q)=100 - Q$; inverse supply function: $Q = 40$.

Problem #2

In a country called Hypochondria the market demand function for vaccinations is given by the formula $Q(P) = 500 - 0.6P$, while the market supply is $Q(P) = 0.4P$, where Q – quantity given in thousands units, P – price in zloty.

a) Describe the equilibrium conditions in this market, i.e. the price and quantity of vaccinations sold.
b) If the government wants to support consumers (buyers of vaccinations) and introduces subsidies amounting to 200 zloty per each vaccination, what will be the equilibrium in this market?
c) How will the situation in this market change if instead of the subsidies the government will introduce maximum prices for vaccinations at the level of 420 zloty?
d) How much will the government spend on subsidies from point b and how much will it spend on supplying the missing vaccinations (deficit) assuming that they must be bought abroad for a world price at the level of 500 zloty and they are re-sold by the government in the domestic market for the maximum price, i.e. 420 zloty (see point c)?
e) Which solution (subsidies or maximum price and supplying the missing quantity by the government) will be advocated by the consumers and which by the importers? (explain on the basis of calculations of producer (importer) surplus and consumer surplus)

Problem #3

The market demand for good X is given by the formula: $q_D = 393 - 2p$, while market supply is: $q_S = p/4 - 12$. Find the equilibrium price and quantity, the consumer and producer surplus, and provide an appropriate graph for the case when the government introduces the following taxes (where necessary, assume that profit is identical with producer surplus):

a) $T = 2q$, each unit sold is taxed;
b) T = 20% TR, total revenues obtained are taxed;
c) T = 20% Π, the firm's profits are taxed;

d) T = 200, the tax is independent of the quantity sold and sales value;
e) *T = 10% Π, Π(0,300]; T = 20% Π, Π(300,600]; T = 30% Π, Π(600,+ ∞), tax on Π (thresholds);
f) *T = 1q, q(0,300]; T = 20q, q(300,600]; T = 10q, q(600,900)$, tax on quantity (thresholds);
g) *T = 1/10 * 0.5q, every unit sold is taxed ;
h) *T = (p* – MC)(p*)Π, profits tax dependent on the margin, where p* is the market price;
i) **T = 10[q/4], one in four units sold is taxed, [x] denotes integer value of x.

Problem #4

In a country there exist two goods, X and Y, for which the mixed elasticity of demand (calculated in both directions) amounts to 0. The country can be treated as a closed economy. Additionally, it is known that demand for these goods is given by the formulas: $p_X = 250 - 5q_X$, $p_Y = 150 - q_Y/5$, while supply is $p_X = 30 + q_X/2$ and $p_Y = 3q_Y - 26$. At the moment the country does not use any taxes or subsidies. Based on this information reply to the following questions. What tax policy (including subsidies) should the government introduce if it is possible to apply only taxes on quantity, the state budget must be balanced, and:

a) the goal is to maximize consumer surplus?
b) the goal is to maximize producer surplus?
c) the goal is to maximize social (economic) surplus?
d) d) How would answers to the above questions change if it were possible to apply only percentage taxes on profits?

Problem #5

The market for tennis rackets is characterized by a linear and upward-sloping supply curve and a linear, downward-sloping demand curve. Currently the government imposes a quantity tax on this good at the level of t per racket. Assume that next year the government is planning to double the tax level. Will this result in (exactly) doubling the deadweight loss?

Multiple-choice questions:

Problem #1

In the case of a monopoly the introduction of a quantity tax t will lead to an increase in the sale price of the good supplied by the monopolist in equilibrium:

a) by t,
b) by t or less,
c) more than by t, by t, or less than by t,
d) less than by t,
e) by t or more.

Problem #2

The inverse demand function for good X supplied by a monopolist is given by the formula: $P(Q) = a - bQ$ (usual notation). The marginal production cost of the monopolist is constant and amounts to c ($a > c$). Find by how much will the monopolist's output change in equilibrium in two cases: (i) when the government introduces a quantity tax t, (ii) when the government supports the monopolist with a quantity subsidy s.

a) Following introduction of the tax output will fall by t, while following introduction of the subsidy it will increase by s.
b) Following introduction of the tax output will fall by $t/2$, while following introduction of the subsidy it will increase by $s/2$.
c) Following introduction of the tax output will fall by $t/4b$, while following introduction of the subsidy it will increase by $s/4b$.
d) Following introduction of the tax output will fall by c-$t/4b$, while following introduction of the subsidy it will increase by c+$s/4b$.
e) None of the above.

Problem #3

In the short run under pure competition, when each seller behaves rationally and aims to maximize profits, the introduction of a lump-sum tax will cause:

a) a decrease in output of an individual firm and an increase of the equilibrium price
b) a decrease in output of an individual firm and a decrease of the equilibrium price
c) an increase in output of an individual firm and a decrease of the equilibrium price
d) One cannot provide a unique answer without knowing the demand function and the tax rate.
e) None of the above.

Problem #4

In a given country up to 2011 the inverse demand function for books was given by the formula $P(Q)= 226 - Q$, while the supply function was $P(Q) = 20 + Q$ (P – price in zloty, Q – quantity in thousands). The market for books is purely competitive. The Value Added Tax (VAT) was not imposed on books. In 2012 the national elections took place and a change of government followed. The new government imposed a 5% VAT on books. How will this influence the market equilibrium conditions?

a) $P = 100$; $Q = 126$
b) $P = 103$; $Q = 97$
c) $P = 108{,}15$; $Q = 91{,}85$
d) $P = 152$, $Q = 48$
e) None of the above.