

DELHI SCHOOL OF ECONOMICS
 Course 001: Microeconomic Theory
 Problem Set 4

1. Suppose the inverse demand function is linear: $p(q) = \alpha - \beta q$. The monopolist's cost function is $c(q) = aq^2$. Assume the monopolist must charge a uniform price.
 - (a) Find the optimum monopoly price and quantity. Also calculate the deadweight loss.
 - (b) Suppose the government can levy a poll tax T (i.e., a fixed amount independent of production) and an excise tax t per unit of production on the monopolist. These taxes can be negative, in which case they are subsidies. The proceeds of these taxes can be transferred to consumers. The monopolist is always free to quit the market, in which case he does not have to pay any taxes. The government wants to maximize consumer welfare. Find the optimum values of t and T .

2. A *monopsony* is the mirror image of a monopoly—it is a market with one price setting buyer and many price-taking sellers. Consider a monopsonistic market in which the (inverse) supply function is $p(q) = a + bq$ (where $a, b > 0$) and the buyer's utility from consuming a quantity q is given by the money metric utility function $u(q)$, with $u'(q) > 0$ and $u''(q) < 0$.
 - (a) Derive an equation that describes the optimum quantity choice q^* for the monopsonist.
 - (b) Prove that q^* is less than what a competitive market (in which both sides were price takers) would have produced.
 - (c) Give the explicit solution for optimum quantity and price when $u(q) = \ln q$ and when $u(q) = \alpha q - \beta q^2$.
 - (d) In the second case above, calculate the deadweight loss due to monopsony.

3. A monopolist sells his good in a market where there is a continuum of consumers of measure 1. Each consumer buys either 0 or 1 unit (imagine the good is something like a washing machine—people do not need more than one). A fraction θ of consumers value the good at v_H , and hence they are willing to pay up to v_H . The remaining $1 - \theta$ fraction value it at $v_L < v_H$. The monopolist cannot distinguish the two kinds of buyers. He can produce the good using a cost function $c(q) = aq^2$, where $a > 0$ is a parameter reflecting the quality of the production technology. Find the profit maximizing price and output. Is the monopolist's output choice continuous in a ?

4. A monopolist sells two goods: TVs and DVD players. There is a continuum of consumers of measure one, each of whom buys either 0 or 1 unit of each product. The value or maximum willingness to pay for each good is either v_H or v_L ($v_H > v_L > 0$). The total willingness to pay for a *bundle* of the two goods (a TV and a DVD player) is the sum of the willingness to pay for each item. Thus each consumer is characterized by a vector of numbers representing her willingness to pay for a TV and a VCR respectively. Consumers' valuations of the two goods is statistically independent, which means the fraction of consumers in each of four categories is as follows

	v_H	v_L
v_H	λ^2	$\lambda(1 - \lambda)$
v_L	$\lambda(1 - \lambda)$	$(1 - \lambda)^2$

where the rows represent the willingness to pay for a TV, the columns represent the willingness to pay for a DVD player and the number in each cell represents the fraction of consumers whose willingness to pay for each product corresponds to the row and column values. The monopolist has no cost of production.

- (a) If the monopolist sells each product separately, find the optimum price for each.
- (b) If the monopolist only sells a bundled product (a TV-DVD player combo), find the optimum price for the bundle.

- (c) Find parameter conditions under which bundled sale will be more profitable than unbundled sale.
5. In an industry, there are 50 competitive firms, each with a cost function $c(y) = \frac{y^2}{2}$, and one dominant firm with 0 cost. Market demand is given by

$$q = 1000 - 50p$$

The dominant firm sets the market price p , and meets the difference between market demand and the supply forthcoming from the competitive firms at that price.

- (a) Find the profit maximizing choice of p , and the corresponding quantities and profits of the dominant firm.
- (b) Compare with the prices and quantities that would have been obtained if (i) the market was perfectly competitive with no dominant firm present (ii) it was a pure monopoly with only the dominant firm present.
- (c) Does the presence of the “competitive fringe” produce higher or lower social surplus compared to pure monopoly by the dominant firm?
- (d) Suppose the government can regulate the industry by banning some firms, dictating the price at which other firms must sell, as well as arranging lump sum transfers among the various parties involved. Starting from the situation in part (a), if the government wants to maximize consumers’ surplus without making any of the firms worse off, what kind of regulation should be introduced?