Homework Policy Goods for all

**Study** You can study the homework on your own or with a group of fellow students. You should feel free to consult notes, text books and so forth.

**The quiz** will be available Wednesday at 5pm. Following the Honor code, you should find 20 minutes and do the quiz, by yourself and without using any notes. Paper and pen should be all you need. Then turn it in by Thursday 5pm. (drop off in box in front of Baxter 133). It will include one question from each section

**The answers** to the whole homework will be available Friday at 2pm.

**Definitions**
Please explain each term in three lines or less

- **Sales taxes:** are taxes on goods and services sold at retail.
- **Dead weight loss:** It is the buyers’ values minus the sellers’ costs of units that are not economic to trade only because of a tax or other interference in the market.
- **Market failure:** It is a situation when a competitive market does not yield the socially efficient outcome.
- **Social cost:** Is the addition of the private costs and the external costs (for a given market).
- **Tragedy of commons:** It is the situation generated because the property rights are not well defined.
- **Local public good:** people living nearby may or may not be excludable, but people living further away can be excluded, and such goods are called “local public goods.
- **Arbitrage:** It is also known as “buying low and selling high,” and represents the act of being an intermediary.
- **Indirect price discrimination:** It is a type of price discrimination that is not based on the identity of the buyer but on the choices by the buyer.
Word problems

Please explain each question in a few sentences.

- The market demand curve for heroin is said to be highly inelastic. Heroin supply is also said to be monopolized by the Mafia, which we assume to be interested in maximizing profits. Are these two statements consistent?

  Sol: we know that the monopolist maximizes profits when marginal revenue equals marginal cost. This condition is given by:

  \[ p \left( 1 + \frac{1}{\varepsilon} \right) = c'(q) \quad (1) \]

  Where the term \( \varepsilon \) is the demand elasticity. Then the Mafia maximizes profits when the condition (1) is satisfied (considering the elasticity of demand). The statement that the demand is highly inelastic and the heroin is produced in a monopolistic way are not inconsistent, because the monopoly condition is given by the costs conditions that makes efficient that the heroin must be sold by monopolist and the demand elasticity represents how the consumer will change when prices changes. Thus, given the demand, the Mafia will choose the level of output that satisfies (1) in order to maximize profits. The statements are not inconsistent.

- A computer programmer lobbies against copyrighting software. He argues that everyone should benefit from innovative programs written for personal computers, and that exposure to a wide variety of computer programs will inspire young programmers to create even more innovative programs. Considering the marginal social benefits possibly gained by his proposal, do you agree with the programmer’s position? Explain

  Sol: The programmer bases his /her argument considering the fact the marginal social benefit is higher than the marginal private benefit because the use of software in the population creates positive externalities. Then, the copyright policy means that the level of software is lower than the optimal. However, there is a problem in her argument, because he does not discuss how to finance his proposal. In particular, programmer’s proposal would mean have to subsidy to manufacturers in order to give them the incentives to produce software. The funding can come, for example, from taxes in other markets, which would produce dead weight losses in those markets. Then, it is not clear how her/his argument would mean that the population is better or worse off. The programmer needs to take into account the costs in benefits for the whole society of his/her proposal.
A number of firms have located in the western portion of a town. The single-family residences took up the eastern portion. Each firm produces the same product and in the process emits noxious fumes that adversely affect the residents of the community.

1. Why there is an externality created by the firms?

Sol: The firms only internalize the marginal private cost that the production of their product generates. The firms do not consider the costs of the negative externality that they impose over the families localized on the other portion of the town.

2. Do you think that private bargaining the problem with the externality? Explain.

Sol: If the private rights and the number of agents is relatively small, then we could invoke Coase’s Theorem in order to solve the problem. Otherwise, we should look at other mechanisms.

3. How might the community determine efficient level of air quality?

Sol: The way to find the optimal level of production is equalizing the marginal social benefit to the marginal social costs. This will imply the optimal (for the whole society) level of production is lower than the level of production of firms.

Technical problems

1. The monopolist faces a demand curve given by \( D(p) = 100 - 2q \). Its cost function is \( C(q) = 2q \). What is the optimal level of output and price?. Compute the dead weight loss.

Sol: The revenue function is \( r(q) = qp(q) = q \left( 50 - \frac{q}{2} \right) \), and the marginal cost is 2. Solving the equation \( r'(q) = 2 \) we find that the optimal quantity is given by \( q^* = 48 \). The optimal price is \( p^* = p(48) = 26 \).

Competitive solution is \( P=MC \) or \( 2=100-2p \Rightarrow q=96 \)

The dead weight loss is \( (p_m-p_c)*(q_q -q_m)/2=(26-2)(96-48)/2=24*24=576 \)

2. The same monopolist faces a demand curve by \( D(p) = 100 - 2q \) but now, its cost function is given by \( C(q) = q^2 \). What is the optimal level of output and price?. Compute the dead weight loss and explain the differences between your answers to questions 1 and 2.

Sol: Now we solve \( r'(q) = 2q \). Thus, we find \( q^* = 50/3 \) and the optimal price is \( p^* = p \left( \frac{50}{3} \right) = \frac{125}{3} \).

Competitive solution is \( P=MC \) or \( 50-q/2=2q \Rightarrow 50= 5q/2=50 \Rightarrow q=20 \ \ \ p=40 \)

The dead weight loss is \( (p_m-p_c)*(q_q -q_m)/2=(20-50/3)(125/3-40)/2=10/3*5/3=50/9=5.55 \)

The answers differ because in the first case we have a constant marginal constant while in the second case the marginal cost is an increasing function of the quantity.
3. Suppose that 10 persons live on a street and that each of them is willing to pay $2 for each extra streetlight, regardless of the number of streetlights provided. If the cost of providing $x$ streetlights is given by $c(x) = x^2$, what is the Pareto efficient number of streetlights to provide?

Sol: $x = 10$. 