

**Due Thursday, February 18, 1999, in class**

(Late assignments will not be graded.)

**Part A: Numerical Problems**

1. Assume we have a monopoly. The market demand function is given by  $p = 200 - 2q$ , where  $p$  is the price in dollars and  $q$  is the quantity demanded. The marginal cost of production ( $mc$ ) is given by  $mc = 20 + 2q$  and the marginal external cost ( $mec$ ) is given by  $mec = 10 + 0.25q$ .
  - a) Determine the socially optimal level of output ( $q^*_s$ ) and the total external cost (TEC) at this level of output.
  - b) Determine the equilibrium output of the monopolist ( $q_m$ ) and the equilibrium price ( $p_m$ ). What is the deadweight loss (DWL) in this case? What is the total external cost (TEC) in this case?
  - c) Determine the consumer surplus (CS) and the producer surplus (PS) under monopoly.
  - d) The government wants to fix the externality problem using a price mechanism. Should the government tax or subsidize the monopolist? Explain.
  - e) What is the optimal level of this tax/subsidy? Explain.
  - f) Assume the government imposes the tax or subsidy found by you in part (e). How does the government's finance change? What is the change in the consumer surplus? What is the change in the producer surplus? What is the change in the total external cost?
  - g) What is the net effect of all the changes found in part (f)? How does this compare to the DWL found in part (b)? Explain.
  
2. Assume there are two groups of people, smokers and non-smokers, and they work together in the same office room. The marginal benefit of smoking is  $MB = 100 - e$ , where  $e$  is the amount of smoke emissions per unit of time, and  $MB$  is defined in US\$. The very annoyed non-smoking group has a marginal cost of  $MC = 0.25e$ .
  - a) What is the optimal level of emissions from the polluter's point of view? From the non-smoking group?. What should the optimal level of emissions,  $e^*$ , be according to you? Explain.
  - b) What is the dead-weight loss in each case?
  - c) If property rights were defined in such a way as to give the smoking group the right to pollute, what are the maximum possible gains from trade by moving to the optimal level of pollution  $e^*$ .

- d) If property rights were defined in such a way as to give the non-smoking group the right to clean air, what are the maximum possible gains from trade by moving to  $e^*$ ?
- e) What would prevent the two groups from moving up to  $e^*$  in the real world? Explain.

### Part B: Essay questions

Write a brief (less than one page) essay on each of the two topics described below. Remember that your answer must be in the form of an essay. (Don't just answer the questions. Discuss the issue!)

1. Read "The EPA's Dangerous Lead Standard". [If you can't read the attached file, go to [www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/1998/12/04/ED107142.DTL](http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/1998/12/04/ED107142.DTL)]

Write a brief economics-inspired response to Mr. Brown's opinion. The following questions are merely suggestions to guide your thinking. You may approach your assignment from a different angle if you choose.

- a) What is the nature of the \$8346? That is, what curve in the basic externality (or cleanup) model would you associate it with?
  - b) The EPA has determined that the total cleanup cost will be equal to the total social cost of "fixing" brain-damaged children when contamination is 2000 ppm. Is this the efficient (welfare-maximizing) level of pollution?
  - c) How does the lower standard make it easier to sell a property? Would a sale eliminate the possibility of an eventual cleanup?
  - d) What market mechanism may have already taken into account the danger, partly compensating for the externality?
  - e) Was the EPA's cost-benefit analysis complete?
2. On January 1, 1998, the State of California introduced a ban on smoking in public bars because of health risks to employees and non-smoking patrons. Examine this issue using the economic tools and concepts (surplus, deadweight loss, tax revenue, ...) you have seen to date. Your discussion should address the following matters:
    - a) What is the primary market failure leading to government intervention?
    - b) Do you feel that there exists a market resolution to this issue?

- c) What group's ownership of property rights is consistent with the smoking ban?
- d) What are some (current or proposed) alternative policies? What are the pros and cons of the different options?