

MIDTERM

Part A: Numerical Questions

1. Assume that the marginal cost (MC) of producing a good is given by $MC = 20 + 3Q$. The marginal benefits (MB) are given by $MB = 120 - 2Q$, and the marginal social benefits (MSB) are given by $MSB = 120 - Q$.
 - a) Calculate the socially optimal level of output (Q^*).
 - b) Calculate the competitive equilibrium output (Q_c) and the competitive equilibrium price (P_c). Determine the deadweight loss (DWL).
 - c) Determine the consumer surplus (CS) and the producer surplus (PS) under the competitive case.
 - d) Assume that the government wants to subsidize production in order to fix the externality problem. Determine the optimal unit subsidy.
 - e) If the government imposes the subsidy found by you in part (d), by how much does the total external benefit change?

2. Assume that you have the following information about the individual demands for a public good:

$$\text{High income: } P_h = 40 - Q$$

$$\text{Low income: } P_L = 20 - Q$$

Assume further that there is a total of 3 people in the “high income” group and a total of 2 individuals in the “low income” group. Finally, assume that the marginal cost of producing the good is given by: $MC = 5Q$.

- a) What is the efficient output level, Q^* , of this public good?
- b) Calculate the total cost of providing Q^* .
- c) What is the minimum uniform fee that a regulated concessionaire could charge each person just to cover its costs? Calculate the consumer surplus of a typical “low income” individual under this fee.
- d) What is the maximum uniform fee that an unregulated concessionaire could charge each person without excluding any individual from consuming the good? Determine the concessionaire ‘s profits under this fee.
- e) What uniform fee would the unregulated concessionaire charge each person in order to maximize profits?

Part B: Essay Questions

This part of the exam asks you to write two separate essays on environmental issues. Your essays must have economic content and follow a logical, organized train of thought. You will find it useful to spend a minute or two outlining your argument before beginning to write.

Essay I.

Motor vehicles, power plants, factories, chemical solvents, combustion products from various fuels, and some consumer products release nitrogen oxide and volatile organic compound gases that react with sunlight to produce ground-level ozone. Ground-level ozone is the primary ingredient in smog and can have harmful effects on human health and the environment.

In choosing between incentive-based instruments (taxes) and direct control measures (standards) to reduce ozone-causing pollution, what considerations would influence the EPA's decision in favor of one type of policy or the other? Be sure to describe the welfare implications under the two types of policies. (You may write your essay in terms of a generic pollutant if you don't know much about smog.)

Essay II.

This month, the federal and California governments announced the purchase from Pacific Lumber Company/MAXXAM of 11 000 acres of forested land in and around Headwaters Grove for \$480 million. The site includes old-growth redwoods and provides habitat for a number of listed endangered species. The area "will be managed as a nature preserve ... to promote the health of the forest and all species within the forest." While public access to the site will be granted, the government reserves the right to limit that access in order to assist conservation.

Write a brief report advising the government of the alternative techniques it could use to place a monetary value on the benefits from preserving the purchased land as a standing forest. Be sure to describe how these techniques could be implemented, as well as the known pitfalls and possible biases associated with each technique.