

**Environmental Economics (AAE / ECON / Env. St. 343 )**

Practice Final Exam.

1. In many cities across the U.S. residents pay for water use via their property tax bill; that is, residents pay a fixed annual water fee (e.g. \$150-200 per year per household). Given this payment mechanism for water use, is it possible that residents wash cars and water lawns more frequently than is economically efficient? What would be the effect on the rate of lawn watering of an increase in the annual water fee? Explain.
  
2. Markets for trading water *quantity* are beginning to take shape in the western United States. Many of the largest water trades involve large municipal water districts as buyers and individual farmers as sellers. Some have argued that allocating the initial property rights for water to individual farmers is more likely to lead to an efficient market outcome than allocating the property rights to municipal water districts. Why might this be? Explain your answer.
  
3. It is a fact that Pacific Salmon runs in the Northwest U.S. have fallen dramatically over the past twenty years. Pacific Salmon are prized by recreational anglers and by the commercial fishing industry. Would you guess that the real market price for Pacific Salmon has increased or decreased over the last twenty years? Does the market price of Pacific salmon correctly capture the economic scarcity of these fish? Explain your answer.
  
4. Explain how non-market valuation methods can be used in determining a green tax rate which reduces pollution efficiently.
  
5. Consider the allocation of a fixed nonrenewable resource over two periods. What assumptions are required for a competitive market to allocate this resource in an efficient *and* sustainable manner? Explain.

The following information applies to questions 6 and 7. Two countries (A and B) are deciding whether or not to reduce an international pollutant. The payoffs for the countries are given as follows:

	B	
A	Don't Reduce	Reduce
Don't Reduce	0-0=0, 0-0=0	50-0=50, 50-120= -40
Reduce	80-100= -20, 80-0=80	130-100=30, 130-120=10

6. If this pollution game is treated as a one-shot game, what is the Nash Equilibrium? What tax imposed by an external regulator would ensure that both countries reduce pollution? Explain why these countries would be interested in having a tax imposed on them.
  
7. Suppose the game above is repeated indefinitely and that each country employs the grim trigger strategy. The countries cooperate with each other until one country cheats (i.e. doesn't cooperate). If one country cheats, each country plays a Nash Equilibrium strategy from a one-shot game for the remaining time periods. Can a grim-trigger strategy ensure that both countries will reduce pollution? Show your work.

8. Consider the case of multiple countries deciding whether or not to cooperate in an international environmental agreement for provision of a non-excludable good. Suppose the costs of not cooperating are \$0 *per country* and the costs of cooperating are \$12,000 *per country*. The benefits of cooperating are \$5000 *for each country that cooperates* and \$0 if no countries cooperate. For example, if three countries cooperate, they pay \$12,000 *each* in costs and they receive \$15,000 *each* in benefits. If four countries cooperate, they still pay \$12,000 *each* in costs but they receive \$20,000 *each* in benefits. What is the maximum number of countries that will cooperate? Explain your answer.

9. The 'broad then deep' strategy is advocated by many as an approach to reducing risks of climate change. Are advocates of this strategy making any implicit assumptions regarding discounting?