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Economics 410

The Maxwell School
Syracuse University

Exam 2

Spring 2011

VERSION P

Instructions

1. Write your **SU ID NUMBER** on your blue book and DO NOT write your name.

2. Write the **EXAM VERSION** from the box above on your blue book.

3. Do not open the exam until you are told to do so.

4. Please turn off the ringer on your phone right now – before the exam begins.

5. If you are wearing a baseball cap, please remove it or turn it backward.

6. SHOW ALL YOUR WORK. Numerical answers without supporting work will receive little or no credit.

7. You have 120 minutes to work on the exam. There are 60 points possible (6 questions with 10 points each); please budget your time accordingly. Also note that many of the questions have (a), (b), etc., inserted into the text to help you avoid overlooking part of the answer.

8. YOU MAY NOT USE YOUR PHONE. *Any use of phones or other wireless devices during the exam will be presumed to be collaboration and therefore cheating.*

9. Cheating of any kind will result in an F on the exam and referral of the case to the Dean's office for further sanctions.

10. Calculators *may not* be shared.

11. Some handy formulas:

$$PV = \frac{B}{(1+r)^t} \qquad PV = \frac{B}{r}$$

Question 1 (10 points)

The marginal benefits of abating a pollutant are given by MBA = 2000 – 2*Q. Two sources of the pollutant were recently regulated. Just before regulation, each source was emitting 500 tons of the pollutant (1000 tons total). At the time of regulation, the sources were believed to have abatement costs given by: MCA1 = 4*Q1 and MCA2=2*Q2. Using this information, the regulator set up a tradable permit system and gave each source exactly the number of permits it would need for its abatement to be efficient. After the system was in place, however, the MCA for source 2 is discovered to be wrong. Source 2's true curve is MCA2 = 4*Q2.

Please calculate: (a) the efficient total quantity of abatement and the MCA if the original MCA2 curve had been correct; (b) the number of permits the regulator gave each firm; (c) the efficient total quantity of abatement given the true MCA2; (d) the deadweight loss, if any, under the permit system; (e) the equilibrium price of a permit under the actual MCA2; and (f) the value of any permit sales from one firm to the other.

Question 2 (10 points)

A state government would like to determine the value of a wildlife preserve. No admission fee is charged and 10,400 people visit the preserve each year. They come from six geographic zones labeled A through F. The cost of a round trip to the site from each zone is shown in the table below, along with each zone's population and the number of people who visit from the zone.

Zone	Travel Cost	Population	Visitors
A	$5	2,000	2,000
B	$15	1,500	1,200
C	$25	7,000	4,200
D	$35	5,000	2,000
E	$45	5,000	1,000
F	$55	9,000	0

The public's willingness to pay for visits to the park (including people from all zones) is known to be given by an equation of the form: W2P = A - B*Q, where Q is the number of visitors and A and B are constants.

In addition, it is also known that 50,000 people who do NOT visit the site value its existence and are each willing to pay $1 per year to keep it protected.

Please compute: (a) the number of people who would visit the site if a $10 admission fee were charged, (b) the values of A and B, (c) the amount of consumer surplus currently produced by the site each year, (d) the annual benefit received by people who don't visit the site, and (e) the present value of keeping the land as a preserve forever when the interest rate is 10%.

Question 3 (10 points)

A city must decide whether or not to sell land currently used for a park. As a park, the land will produce $20 million of recreation benefits in period 0 but its benefits in period 1 are uncertain. The city believes there is an 80% chance the recreation benefits will drop to $10 million and a 20% chance they rise to $130 million. A developer has offered to buy the land for either $50 million in period 0 or $30 million in period 1. Development is irreversible and eliminates recreation benefits beginning the year it occurs (i.e., selling the land at 0 eliminates the $20 million in period 0). The city uses an interest rate is 25%.

Please: (a) calculate the present value of the park in period 0; and (b) indicate whether or not the firm should sell the park in period 0.

Question 4 (10 points)

Suppose a city of 1 million people needs a new site for new prison. Each individual's marginal benefit from a prison of size Q would be MBi = 5 - (1/200)*Q, and you may assume that the prison is a non-rival good (from the point of view of the public). The cost of the prison is given by MC = 15000*Q. The prison would be located in a neighborhood within the city that has 125000 people.

Please calculate: (a) the efficient size of the prison from the point of view of the city as a whole; and (b) the net social surplus produced by the prison. Now suppose that the costs are borne entirely by the local neighborhood. Please calculate: (c) the efficient size of the prison from the neighborhood's point of view; (d) the neighborhood's gain or loss from construction of a prison of the size in part (a); and (e) briefly discuss the political implications of your result.

Question 5 (10 points)

Consider the allocation of an exhaustible resource across three generations. The following information is available about demand and MEC in the three periods (today is generation 0):

Period	Demand	MEC
1	$W2P_0 = 500 - 2Q_0$	40
2	$W2P_1 = 700 - 2Q_1$	50
3	$W2P_2 = 900 - 2Q_2$	60

Initially, there are 800 units of the resource available. The interest rate between generations is 100%.

Please calculate: (a) the equilibrium royalty, extraction cost, price and quantity that would occur in each period, and summarize your results in a table. Then suppose that a backstop is available at a marginal cost of $140. Please calculate: (b) the new equilibrium royalty, extraction cost, price and quantity in each period, summarizing your results in a second table. Finally, calculate (c) the total amount of the resource produced via the backstop.

Question 6 (10 points)

Suppose that a resource is to be allocated across two periods. The demand for the resource in period 0 is given by $W2P_0 = 500 - 2*Q_0$ and the demand for the resource in period 1 is given by $W2P_1 = 600 - 2*Q_1$. Initially, 350 units of the resource are know to be available and can be extracted at MEC = $50 in either period. However, it is possible to find more of the resource via exploration. The cost of drilling an exploratory well is $200. In 80% of the wells, no new deposits will be found. However, in 20% of the wells, an average of 10 units will be found. The marginal cost of extracting any new units is the same as the existing deposits: $50. The interest rate is 100%.

Please calculate: (a) the marginal discovery cost; (b) minimum price that will induce exploration; (c) the market equilibrium price and quantity in each period without exploration (summarize in a table); (d) the equilibrium price and quantity in each period taking exploration into account (summarizing in a second table); (e) the amount of the resource that will be found via exploration; and (f) the expected number of wells that will be drilled.