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Economics 410

The Maxwell School
Syracuse University

Exam 2

Spring 2006

VERSION J

Instructions

1. Write your SU ID NUMBER and the exam version letter above on your blue book. Please do NOT write your name.

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

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

4. Write on both sides of the bluebook pages.

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

6. Label all graphs, axes, curves, lines, points, etc., carefully.

7. You have 120 minutes to work on the exam. There are 75 points possible; please budget your time accordingly.

8. Calculators may be used but may NOT be shared.

9. Collaboration of any kind on the exam is not allowed. Use of phones, computers or text messaging will be presumed to be collaboration – so don't do it. Cheating of any kind will result in an F on the exam and referral of the case to the Dean's office.

10. Some handy formulas:

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

1 Measuring the Value of a Park (10 points)

A state park currently charges no admission fee and is visited by 582 people each day. A researcher has interviewed a sample of the visitors and has concluded that they come from 6 geographic zones. She has collected the following data, where "Travel Cost" is the round-trip transportation cost of visiting the park:

Zone	Travel Cost	Population	Visitors
1	$5	300	30
2	$10	900	72
3	$15	2000	120
4	$20	5000	200
5	$25	8000	160
6	$30	2,000	0
		Total	582

It is also known that the total number of visits to the park (including people from all zones) is given by an equation of the form: P=A-B*Q, where P is the admission fee, Q is the number of visitors, and A and B are constants.

Please calculate the number of people who would visit the park if a $5 admission fee were imposed. Then use your result to calculate the daily value of the park.

2 Risk Assessment (10 points)

Suppose that a clinical study has been conducted of a particular pesticide. No epidemiological studies of the substance are available but a clinical trial on rats has been conducted. When 200 rats were exposed to 1000 mg (milligrams) of the chemical, 5 of them developed fatal cases of cancer. Right now, 200,000 people are exposed to the pesticide and the dose each person receives is 2 mg. The population's willingness to pay to save a statistical life is $6 million. The dose-response function for this chemical is believed to be linear.

Please calculate the value of reducing the dose received by each person to 1 mg.

3 Allocating River Water (20 points)

A town gets its drinking water from a nearby river. The marginal cost of the water is zero and the town's demand is given by: W2Pd = 2200 – 2*Qd. Five hundred (500) local residents also use the river for recreation (swimming, fishing and boating). Each one receives the following marginal benefits from Qs units of water left in the stream: MBi = 2 – (1/250)*Qs. The quantity of water in the river is initially 1200 units. Water taken out of the river for drinking does not return to it, and cannot be used for recreation.

Part (a): Please calculate the efficient allocation of water to the two uses.

Part (b): Please calculate the net deadweight loss (inefficiency) that would occur if the river is common property and the town ignores recreation when deciding on Qd.

4 Oil Extraction (20 points)

Consider the allocation of an exhaustible resource across three generations. The following information is available:

- Demand in period 1: W2P1 = 1500 – (1/4)*Q1
- Demand in period 2: W2P2 = 2500 – (1/2)*Q2
- Demand in period 3: W2P3 = 4500 – Q3
- Resource available: 4400 units
- Marginal extraction cost: $500
- Interest rate: 200% (please note the 2)

Part (a): Please calculate the market equilibrium. Summarize your results in a table giving the values of the following variables in each of the three periods: royalty, price and quantity.

Part (b): Now suppose that a backstop resource is available at a marginal cost of $3200. Please calculate the new equilibrium (royalty, price and quantity in each period). Also calculate the total amount of the backstop that will be produced.

5 Exploration (15 points)

Suppose that a supply of natural gas is to be allocated across two identical periods with the following characteristics:

- Demand: W2Pi = 740 – Qi
- Marginal extraction cost: $140
- Known quantity available: 600 units
- Interest rate: 100%

In addition, it is possible to find additional units of gas via exploration. The cost of drilling a well is $160. Eighty percent (80%) of the time, no gas will be found and 20% of the time 2 units will be found (note the 2).

Please calculate the market equilibrium taking exploration into account. Summarize your results in a table giving the values of the following variables in each of the two periods: royalty, price and quantity.

Also, please calculate the number of units that will be found via exploration.