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Exam 2
Fall 2003

DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

Instructions

Write your SUID in the upper right corner of this exam. Do NOT write your name.

SHOW ALL YOUR WORK. Answers without supporting work will receive little or no credit.

Do all your work on this exam. If you need extra space, write on the backs of the pages. However, if you do write an answer on the back of a page, *be sure you've noted that near the question*.

You may *not* discuss the exam with anyone until after 4pm today.

Some helpful PV formulas:

$$(1)\ \frac{B}{(1+i)^t} \qquad\qquad (2)\ \frac{B}{i}$$

Some helpful factors in case your calculator can't handle exponents:

t	1	5	10	15	20	25	30	35	40
(1.05)^t	1.0500	1.2763	1.6289	2.0789	2.6533	3.3864	4.3219	5.5160	7.0400

Question 1

What does it mean in economics for someone to have rational preferences? Please explain in detail. Do economists believe that individuals are always rational in all circumstances? Discuss.

Question 2

Suppose that malaria could be eradicated in a given geographic region by a policy that costs $300 million a year for 25 years. In addition, suppose that it has been estimated that the benefit of eradication would be $1 billion a year but the benefits would not commence until the eradication program had been completed. Draw a diagram showing the cash flows associated with this policy and then compute the policy's present value. Based on your results, should the government of the region proceed with the policy? Explain. You may assume the interest rate is 5%.

In setting up this problem, you may assume that the first payment for eradication occurs in year 1 and the last payment occurs in year 25. The first benefit from eradication arrives in year 26. Note that eradication means that the problem has been permanently eliminated.

Question 3

For many years the University of Iowa has operated an electronic market where people can buy or sell securities whose value is determined by the outcome of political elections. For example, it is possible to buy a security that will be worth $1 if Howard Dean wins the Democratic nomination for president; the security will be worth $0 otherwise. The price of such a security is currently $0.44.

(a) Suppose someone buys one unit of the security. What will her *net* payoff be if Dean wins? What will her net payoff be if anyone else wins? Be sure to show your work.

(b) Suppose the buyer initially has $100 before buying any Dean securities. Construct a graph showing her consumption in two states of the world: D for "Dean wins" and A for "All other outcomes". Put consumption in state D on the vertical axis. Show the person's endowment and all points that are feasible by buying Dean securities.

(c) The Iowa market is composed of many different buyers and sellers and is likely to be pretty close to risk-neutral overall. If the price of the Dean security is actuarially fair, what is the market's current estimate of Dean's probability of winning the nomination? Be sure to show your work.

Question 4

A property developer is considering building on a brownfield site. The city is supplying the land for free in order to eliminate the brownfield. However, developer knows that there is a 50% chance the property is contaminated with a pollutant. If the property is clean, it is worth $4 million. If it turns out to be contaminated, the firm will have to remove the pollutant and the net value of the property will be -$10 million. You may assume that as soon as the developer buys the property, the uncertainty will be resolved and it will become clear whether the site is polluted.

A test costing $100,000 is available that could be used *before* buying the property. When pollution is not present, the test never indicates that the site is polluted (that is, it always reports that clean sites are clean). However, when pollution *is* present, the test only detects it 50% of the time. Please construct an appropriate decision tree, label it carefully, and then *calculate the expected value of the test.* Would the developer order the test? Why? Be sure to show all your work.

Question 5

A city is considering building a light rail system (essentially an above-ground subway) to reduce congestion and pollution. The cost of building the system is known to be $100 million per year for 20 years. The number of riders for the system is harder to predict because this particular city has never had light rail before. Based on a comparison to similar cities, a consultant estimates that there is an 60% chance the system would be popular and if it is, its annual value would be $200 million. If it does not turn out to be popular, however, its annual value would only be $50 million.

You may assume that the interest rate is 5%, and that the city is risk-neutral. Furthermore, the construction payments will occur on years 1 through 20. The benefits would begin in year 21 and would occur every year forever.

(a) Should the city build the system? Please be sure to show all your work.

(b) What is the minimum probability of high ridership at which it makes sense to build the system? Be sure to show your work.