Microeconomics Policy
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Problem Set 1: Question 4

1. Value of information. The policy maker faces the following risk: a big building may have a structural problem and collapse. The probability of a full collapse is .001, partial collapse happens with probability .004, and no collapse with .995. Let us call these outcomes A_1, A_2, A_3, respectively. There are three options for actions: (1) full evacuation, (2) partial evacuation, and (3) no action. Let as call these actions a_1, a_2, a_3, respectively. The payoffs are measured as costs and they are as follows for the outcome-action pairs:

	A_1	A_2	A_3
a_1	5060	1060	60
a_2	10020	2020	20
a_3	30000	6000	0

   (a) What is the optimal action?

   (b) Engineers propose a structural test that can detect full collapse precisely. Thus, the test can tell if A_1 happens but it cannot identify partial collapse. Engineers also tell that with probability .001 the test will tell us that there will be a full collapse. How much the policy maker should pay for the test at most?

2. This problem again considers the sensibility of having a test on a problem before action but now the test is not perfectly informative. The test allows the decision maker to acquire information which leads to more precise actions but the final gain depends on the price of the test. The prevalence of a disease among a certain population is .40. That is, there is a 40 percent chance that a person randomly

selected from the population will have the disease. An imperfect test that costs 250 is available to help identify those who have the disease before actual symptoms appear. Those who have the disease have a 90 percent chance of a positive test result; those who do not have the disease have a 5 percent chance of a positive test. Treatment of the disease before the appearance of symptoms costs 2,000 and inflicts additional costs of 200 on those who do not actually have the disease. Treatment of the disease after symptoms have appeared costs 10,000.

What is the expected cost from each of the following policies:

(a) Do not test and do not treat early.

(b) Do not test but treat early.

(c) Test and treat early if positive and do not treat early if negative.

What is your policy recommendation? Find the treatment/testing strategy that has the lowest expected costs.