Econ 4211
Midterm exam

Please, write your solution in the space provided. Prove your answer.

Spring 2008

Honor code. On my honor, as a University of Colorado at Boulder student, I have neither given nor received unauthorized assistance on this work.

NAME:
Signature

1. (40%)Two villagers want to hire several Samurai days to protect their crops. It costs 4 bags of rice to hire a Samurai for one day. Assume (for simplicity) that the villagers' preferences are defined over bundles of rice, (consumed privately) and "safety" (number of Samurai days in the village). The utility of the two villagers, a, b are:

$$\begin{aligned} u_a(r_a, g) &= 4\ln g + \ln r_a \\ u_b(r_b, g) &= 16\ln g + \ln r_b \end{aligned}$$

where r_a is the rice (in bags) consumed by villager a and r_b is the rice consumed by villager b, g is the number of Samurai days hired in the village. The first villager holds initially $R_a = 100$ bags of rice and the second one has $R_b = 120$.

   (a) (5) Write down the resource constraint of the village (in terms of bags of rice).

(b) (5) Formulate the problem of the benevolent planner (the wise man) for this village.

(c) (10) Solve the problem. What is the optimal number of Samurai that the villagers should hire together? (Hint: in this case the wise man has to solve for both the rice consumption and the number of samurai – use all the optimality conditions from the wise-man problem.)

(d) (15) Assume now the villagers decide how much protection to hire without consulting each other or the wise man (each decides on own expense on the Samurai taking the decision of the other as fixed.) How many Samurai will be hired then?

(e) (5) Do the two answers (c,d) differ? Why? What problem does the Wise Man help the villagers to solve?

2. (30%) Recall the example from class. There are two plants in the region that pollute the air. For each level of pollution the table contains the cost (in, say, thousands of dollars per year) of the optimal operation for each of the plants:

Amount of Pollution	4t	3t	2t	1t	0t
Plant A	100	190	600	1200	2000
Plant B	50	80	140	230	325

Assume also that the marginal damage created by each additional ton of pollution to the residents of the region is estimated to be 200.

(a) (5) How much pollution will be emitted by the plants if none of them is made liable for the pollution?

(b) (10) Assume the "Green Watch" group in the community realizes that there is a technology available to each plant to eliminate all the pollution. They appeal to you, the mayor (overseeing the region) to impose a regulation prohibiting any emission from either plant. If you are solely interested in furthering efficiency (finding the Pareto efficient allocation) should you agree with the group? Why? Provide calculations to support your answer.

(c) (15) Suggest a way to restore efficiency in your region. Describe the policy you will use, the reaction of each plant and why the resulting allocation is Pareto efficient.

(30%) Choose only one of the following two problems (either a or b).

3.a Explain, by using your understanding of social insurance, the following empirical finding.[1] Citizen's belief that (pure) luck determines income is positively correlated with the social spending (as a % of GDP).

3.b Provide an example of a project (including the stream of benefits/costs) the present value of which is positive under 3% discount rate and negative under 7% discount rate. Provide one argument in support and one argument against implementing such a project.

[1] See, for example, Roland Bénabou and Jean Tirole, "*Belief in a Just World and Redistributive Politics," NBER,* W11208.