Econ 301: Intermediate Microeconomics Spring 2014

Discussion Section #12 Handout May 2nd

Problem 1 (Public Goods)

Andy and Beth live near the beach in California where the risk of tsunami is relatively high. They both offer fishing trips to the tourists in the area. Their business has two types of expenditures: motor boats (m) and tsunami alert systems (t). Tsunami alert systems are non-excludable nor rival, and therefore are a public good. In addition, these systems are not perfect: in many cases they produce false alarms. Tourists like being safe, but can get annoyed if too many boat trips are canceled because of malfunctioning alarm systems. The profits of Andy's firm are given by $\pi^A = 5\ln(t^A + t^B) + \ln(m^A) - t^A - m^A$. The customers of Beth are less worried about tsunami threat, so her profits are $\pi^B = \ln(t^A + t^B) + \ln(m^B) - t^B - m^B$.

a) Suppose $t^A = 0.25$. Find the optimal level of investment in the tsunami alert systems by firm B, t^B. Mark this point in the space (t^A, t^B).

b) Find analytically the best response function for firm B and plot it on your graph from part a).

c) Find the best response function for firm A. Add it to the graph in part a).

d) Find the (Nash) equilibrium for two firms. What is the total amount of money invested in tsunami alert systems?

e) Is the predicted outcome associated with free riding? If yes, by which firm? Explain why this firm is free riding?

f) What is the Pareto efficient joint level of investment in tsunami alert systems? Is it greater, smaller or equal to the one observed in the market (part d))?

Problem 2 (Production Externalities)

Firm S produces steel(s), and also produces a certain amount of pollution (x) which it dumps into a river. Firm F, a fishery, is located downstream and is adversely affected by S's pollution. Suppose that the steel firm's cost function is given by $TC_S(s,x) = \frac{1}{4}s^2 - 2x + x^2$ while the fishery's cost function is $TC_F(f,x) = \frac{1}{2}f^2 + xf$. The price of steel and fish is $p_s = 1$ and $p_f = 2$, respectively.

a) Find the amount of steel s and the amount of pollution x that maximizes the firm's profit.

b) Given an amount of pollution x, find the optimal level of production of fish f and the fishery's profit.

c) Express the joint profit function.

d) Find the Pareto efficient level of production (s, x, f).

Problem 3: Adverse Selection

You have decided to learn how to play the drums and so are looking to buy a used drum set on eBay.com. Suppose eBay does not allow sellers to post pictures, so you cannot verify the condition of the drum set, but you know that there are two general conditions that used drum sets come in – "Good" and "Bad". Here are the valuations for a buyer and a seller for the two conditions:

	Good	**Bad**
Buyer	$60	$20
Seller	$50	$10

1. If there are equal numbers of Good and Bad used drum sets on eBay, what are the gains to trade in this market?
2. If there is perfect information (i.e., sellers always truthfully reveal the condition of the drum set), how much would Good and Bad drum sets sell for (give two prices)?
3. The equilibrium in the market will be a separating equilibrium if only Bad drum sets are traded and a pooling equilibrium if both types of drum sets are traded. What is the maximum probability of encountering a Bad drum set that would result in a pooling rather than a separating equilibrium?
4. Would the outcome be Pareto efficient if there is an equal chance of encountering a Good and a Bad drum set? How about if the probability of encountering a Bad drum set is equal to 1/5?

Problem 4: Signaling

You own a shoe repair business and decide to hire a temporary assistant. You know that the pool of candidates for the assistant job consists of two types, Fast and Slow, with the Slow assistants being 1/3 of all candidates. The Fast assistants can repair 18 pairs of shoes per week and the Slow assistants can repair only 6 pairs per week. You will pay your assistant a sum equal to the expected number of shoes per week that he can repair.

1. If there is no way for you to distinguish between fast and slow candidates, what amount would you pay the person you hire?

Now suppose that you can first test the candidates by asking them to perform basic repair tasks. Since the Fast assistants are more efficient, performing n tasks costs them $\$n/5$, whereas n tasks costs the Slow assistants $\$3n/5$.

2. What is the minimum number of tasks performed that would be a credible signal to you that a candidate is of the Fast type?