Network Economics   **Prof. N. Economides**
and the "New Economy"   Fall 1999
Problem Set 3

1.   The setting for this game is South Pacific in 1943. Admiral Imamura needs to transport Japanese troops from Rabaul in New Britain to New Guinea which lies across the Bismarck sea. The Japanese fleet can either sail north of New Britain where the weather is likely to be foggy, or south of New Britain where the weather is likely to be clear. Admiral Kenney of the U.S. hopes to bomb the troop ships. He has to choose whether to concentrate his reconnaissance aircraft on the Northern or Southern Route. Once the convoy is found, the U.S. can bomb it until it reaches New Guinea. Kenney's staff estimates the number of days of bombing for each outcome. The payoffs to Kenney and Imamura are shown in the box below.

<center>Imamura</center>

		North	South
	North	(2, -2)	(2, -2)
Kenney			
	South	(1, -1)	(3, -3)

(a)   Is this a constant-sum game?
(b)   Are there any dominant strategies for any player?
(c)   Identify any non-cooperative equilibria.

2.   Albert and Victoria are roommates. Each prefers a clean room, but neither wants to put the effort to clean it. If both clean the room, they each get a payoff of 5. If one cleans and the other does not clean the room, the person who does the cleaning has a utility of 0, and the person who doesn't has a utility of 8. If neither cleans the room, they both get a utility of only 1. Identify the strategies for each player and construct the payoff matrix. Are there dominant strategies? Identify any non-cooperative equilibria.

3.   Two pigs are put in a box with a food dispenser at one end and a panel at the other end. When the panel is pressed, the pig that presses it loses the utility of two units, and 10 units of food are dispensed. The pig that presses the panel arrives at the dispenser second. If they press the panel simultaneously, they arrive to the dispenser at the same time. Pig no. 1 is "dominant". If it gets to the dispenser first, the other pig gets only the leftovers, which are worth one unit. If both arrive at the same time, the dominant one eats 7 units. If the small pig gets there first, it eats 4 units of food. Assume that each pig has two strategies: press the panel, and wait. Are there dominant strategies? Identify any non-cooperative equilibria.

4.   A monopolist has a cost function given by $c(y) = y^2$ (and therefore $MC(y) = 2y$) and faces a demand curve given by $P(y) = 120 - y$.

(a)   What is his profit-maximizing level of output? What price will the monopolist charge?

(b)   If you put a lump sum tax of $100 on this monopolist, what would his output be?

(c)   If you wanted to choose a price ceiling for this monopolist so as to maximize consumer plus producer surplus, what price ceiling should you choose?

(d)   How much output will the monopolist produce at his price ceiling?

(e)   Suppose that you put a specific tax on the monopolist of $20 per unit output. What would his profit-maximizing level of output be?