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Microeconomics **Prof. N. Economides**
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Problem Set 8

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. The payoffs to Kenney and Imamura are shown in the box below.

		Imamura	
		North	South
Kenney	North	(2, -2)	(3, -3)
	South	(1, -1)	(4, 0)

(a) Is this a constant-sum game?
(b) Are there any dominant strategies for any player?
(c) Identify any non-cooperative equilibria.
(d) Suppose now that the Kinney moves first and Imamura moves second. Write down the extensive form game and identify any non-cooperative equilibria.
(e) Now suppose that Imamura moves first and Kinney moves second. Write down the extensive form game and identify any non-cooperative equilibria.
(f) Compare the equilibria of the three games and comment.

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 in a simultaneous-moves game. 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. Because it takes time to press the panel, 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: (i) press the panel; and (ii) wait. Are there dominant strategies? Identify any non-cooperative equilibria.

4. In 2008, Hillary and Barack considered using defaming strategies which will be denoted by "M" for mud. The alternative strategy is not to defame the opponent, that is, strategy "N". Suppose the first player is Hillary. Assume that the payoffs are (N, N) → (5 ,5); (N, M) → (0, 6); (M, N) → (6, 0); and (M, M) → (2, 2).

(a) Do the players have dominant strategies? What is the non-cooperative equilibrium?

(b) Now assume that Barack does not like the M strategy provided the opponent does not use it, and therefore gets less utility than before at (N, M), so that (N, M) → (0, 3). Do the best replies change? Do the players have dominant strategies? Does the equilibrium change?

(c) Now assume that Barack does not like the M strategy no matter what the opponent does, so that not only (N, M) → (0, 3) but also (M, M) → (2, -1). Do the best replies change? Do the players have dominant strategies? Does the equilibrium change?

(d) Now assume that we are in the original payoffs of (a) but Barack's voters prefer that he plays the N strategy, so he gets 3 extra units (compared to (a)) when he uses the N strategy. Show that the equilibrium is the same as in (c).