MA 493 Homework 6

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1. Problem 6.9. The answer to part a is given below, but you should explain the numbers. In part c, ignore the last four questions.

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		2	**4**
Iran	**2**	(46,42)	(26,44)
	4	(52,22)	(32,24)

2. Problem 6.12. In this problem the ith student's strategy is a number x_i, $0 \leq x_i \leq 1$, which represents the amount that student chooses to deposit in the public account. A strategy profile is therefore a 10-tuple $(x_1, x_2, \ldots, x_{10})$ with $0 \leq x_i \leq 1$ for each i.

   Ignore questions a–d, and instead answer the following.

   (a) Find the ith player's payoff function $\Pi_i(x_1, x_2, \ldots, x_{10})$. (The answer is $\Pi_i(x_1, x_2, \ldots, x_{10}) = 1 - x_i + \frac{1}{2}(x_1 + x_2 + \ldots + x_{10})$; you should explain this.)

   (b) Show that each player has a strictly dominant strategy: Whatever the other players do, contribute nothing. (For example, consider player 1. Given any choices $(x_2, \ldots, x_{10})$ by the other players, player 1 maximizes his payoff by choosing $x_1 = 0$.) Therefore the only Nash equilibrium is $(0, 0, \ldots, 0)$, at which each player's payoff is 1.

   (c) Suppose the game is repeated every day. Consider the following strategy σ_x, where $0 < x \leq 1$: "I will contribute x dollars on day 0. If every other player contributes at least x dollars on day k, I

will contribute x dollars on day $k+1$. If any player contributes less than x dollars on day k, I will contribute nothing on every subsequent day." Show that if $\delta \geq \frac{1}{9}$, then it is a Nash equilibrium for every player to use the strategy σ_x. (In other words, $(\sigma_x, \sigma_x, \ldots, \sigma_x)$ is a Nash equilibrium.)