Econ 302: Microeconomics II - Strategic Behavior

Midterm # 2 – July 21 2015,
11:30– 12:30

Instructions: Read the questions carefully and make sure you answer all parts of the question. You will lose points if you do not explain your result, if the question asks you to do so. You may want to do Question 2 last (it's tricky). Watch your time. Good luck!

1. **(5 points, Externalities)** True/False/Uncertain? Explain briefly (e.g., with a graph) If there are negative externalities in production or consumption, the competitive equilibrium is generally inefficient. Positive externalities, however, cause benefits and therefore enhance the efficiency of the market.

2. **(8 points, Mixed Strategies)** Consider the following two-player game in normal form:

		Column L	Column R
Row	U	$4,3$	$1,0$
	M	$3,1$	$3,2$
	D	$0,3$	$4,0$

   a) Determine the pure strategy Nash equilibrium/equilibria. You don't have to explain your answer.

   b) Is there a mixed strategy equilibrium in which Row plays strategy U with probability zero? If yes, compute the equilibrium (Hint: Solve for the equilibrium assuming that U is never played and then check if U yields a strictly higher payoff).

   c) Show that there is no mixed strategy equilibrium in which Row uses all three strategies with strictly positive probabilities! (Hint: What condition would have to hold if Row was to strictly mix over U,M, and D?)

3. **(12 points, Private Provision of Public Goods)** Anke ($i = A$) and Barbara ($i = B$) are roommates and have to determine how many hours of laundry they'll do each month. If each puts in $g_i, i = A, B$ hours, the total amount of laundry they get done is $G = g_A + g_B$. The utility functions are

$$u_A = 10\sqrt{G} - g_A \qquad \text{and} \qquad u_B = 8\sqrt{G} - g_B.$$

   a) Show that the Pareto optimal amount of G is 81 hours (they have a lot of clothes!).

   b) Consider a one-shot game in which $i = A, B$ simultaneously decide on g_i, taking their roommate's contribution as given. Derive the best response functions and calculate the Nash equilibrium contributions, showing that Barbara will not do *any* laundry at all.

c) Anke is a game theorist and has an idea. She tells Barbara that she'd be doing all her laundry hours g_A the first day of the month. Barbara will thus have to choose her hours g_B *after* observing g_A. What do you expect to happen to A's and B's equilibrium contributions $g_i, i = A, B$, and the total amount of laundry done G? Can Anke's plan make her better off? Give a careful intuition! (Note: I am not asking you to necessarily compute the new equilibrium here – an intuitive argument can be enough).