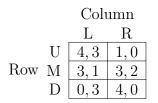
Econ 302: Microeconomics II - Strategic Behavior

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

Instructions: <u>Read</u> the questions carefully and make sure you answer <u>all</u> parts of the question. You will <u>lose points if you do not explain your result</u>, 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:



- 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

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

- 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).