Introduction to Game Theory for Law and Philosophy Students
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Problem Set 4 (More- Nash Equilibrium)

1. Beautiful Mind

Watch the clip from the movie "Beautiful Mind" at
http://www.haverford.edu/math/lbutler/GoverningDynamics.mov .

Does the Prisoner’s Dilemma describe the situation well (as Hollywood claims) or does another game fit better?

2. An Article in Haaretz

Read the article by Gideon Samet originally published in Haaretz in 1995 at http://arielrubinstein.tau.ac.il/gamet/samet.htm.

What do you think?

3. Seller-Buyer

Consider the following buyer-seller situation: A potential buyer of a certain property can make one of two price offers: High or Low. The seller can only accept or reject the offer. In case of rejection, the two part ways without closing the deal. Assume that both parties would prefer closing to not making a deal; that the seller prefers a deal with the high price rather than the low price; and that the buyer prefers a deal with the low price rather than the high price. Assume that the seller formulates a plan for responding to each of the potential buyer’s offers ahead of time (that is, before the actual offer is made).

Model the situation as a strategic game and calculate all Nash equilibria for the game.

4. Timing games

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(a) Two firms prepare for the launch of the same new product. The firm that launches the new product first will capture the market, but the product's value to the firm will be greater the more time is spent developing it prior to launch. Denote by $v(t)$ the value of the product to the firm that captures the market. Assume that $v(t)$ is positive and a strictly increasing function (such as $v(t) = t$). In the case where both firms launch the product at the same time, firm 1 will capture the market.

Model the situation as a game with continuous time (a point in $[0, \infty)$) and show that the game has a unique Nash equilibrium.

(b) Two players are fighting. Each day, the individual players have to decide whether to concede or not. Once one of them concedes, the game is over; the player who conceded then receives $\$L$ while the other player receives $\$H$ (where $H > L$). In the case where both concede on the same day, the winner is chosen randomly, with each player having the same probability of "winning". For each day that passes without a player conceding, player i incurs a cost of $c_i > 0$.

Model the situation as a game and calculate its Nash equilibria.