Professor Yuliy Sannikov, sannikov@econ.berkeley.edu

593 Evans Hall. Office Hours (starting next week)

Mon, 2-3pm and Thu, 2-3pm

GSIs: Kristof Madarasz, madarasz@econ.berkeley.edu

Yooki Park, yooki@econ.berkeley.edu

Grading requirements:

3 problem sets: 20%

Final exam, Mon. December 19, 2005, 12:30pm-3:30pm location TBA: 80%

Optional readings: Mas-Colell, A., M. Whinston, and J. Green, *Microeonomic Theory*, Oxford University Press, 1995

To describe a game, one has to state

- how many players there are
- what actions they can take, in what order, and what do they know when they take actions
- what payoffs do players get, depending on the actions they took and the moves of chance

Definition. A *strategy* is a complete plan of actions of a player (has to specify a player's action in all situations that can arise in a game, where it is that player's turn to move).

Example 1: Cournot competition (Simultaneous-move game)

There are N firms with zero marginal costs that are competing with each other in a market with homogenous goods. Each firm simultaneously chooses a quantity of its product q_i, $i = 1, \ldots N$ to send to the market. The market price, which depends on the total supply, is given by

$$P = 10 - (q_1 + q_2 + \ldots q_N)$$

Firm i's profit is given by Pq_i. How will the firms behave?

Example 2: Auction (Simultaneous-move game with incomplete information).

A seller holds a first-price auction for an object. There are N bidders, each of whom has valuation v_i for the object. Valuation is private information, and one usually makes assumptions about how they are distributed, e.g. independently uniform on [0, 1]. Each bidder decides how much to bid. The object goes to the highest bidder, who pays his bid and gets the payoff of

$$v_i - p_i$$

All the other bidders get a payoff of 0.

Example 3: Rubinstein Bargaining (Sequential-move game with perfect info).

Two players are deciding how to split surplus of the size 1, and the split is determined by an alternating-offer bargaining game. In period 1 player 1 makes an offer how to split 1, and player 2 decides whether to accept or reject. If player 2 accepts, the game ends with a proposed split. If player 2 rejects, he gets to make the offer in the next period. If no offer has been accepted, player 1 makes an offer in odd periods, and player 2 makes offer in even periods. Players prefer to agree sooner rather than later: they discount future payoffs with a discount factor δ. That is, if player 1 gets x in period t, his payoff is

$$\delta^{t-1} x$$

Example 4: Limit pricing (sequential moves, imperfect information)

This is a two-period setting. There is an incumbent firm, who is a monopolist in the first period, and a potential entrant. The incumbent can be low-cost or high-cost. The entrant does not know if the incumbent is low-cost or high-cost, but can see the quantity that the incumbent sells in the first period. Based on the quantity he observes, the entrant must decide whether to enter in the second period. There is a cost to entering, and the entrant knows that he can recover the cost and make profit if he has to compete against a high-cost incumbent, but cannot do so if he has to compete against a low-cost incumbent.