Week 1 - Game Theory and Auctions

Chapter 1:

- A model is an abstraction we use to understand our observations. Models derive power from their simplicity.
- Thus, the interaction between our ideas and models designed to shed light on them runs in two directions: the implications of models help us determine whether our ideas make sense, and these ideas, in the light of the implications of the models, may show us how the assumptions of our models are inappropriate.
- The theory of rational choice is that a decision-maker chooses the best action according to her preferences, among all the actions available to her.
- We can "represent" the preferences by a payoff function, which associates a number with each action in such a way that actions with higher numbers are preferred.
  Ex 5.3 => 2x+y: f(1,4) = 6, f(2,1) = 5, f(3,0) = 6
- A payoff function that represents a decision-maker's preferences also conveys only ordinal information. They may tell us that the decision-maker prefers the action a to the action b to the action c, for example, but they do not tell us "how much" she prefers a to b, or whether she prefers a to b "more" than she prefers b to c. If payoff function u represents a decision-maker's preferences then any increasing function of u also represents these preferences. (Ex - u(a) = 0, u(b) = 10, u(c) = 100 is equivalent to v(a) = 10, v(b) = 100, v(c) = 101.)
- The theory of rational choice is: the action chosen by a decision-maker is at least as good, according to her preferences, as every other available action.
- A strategic game - focuses on the actions of individuals, considers situations in which actions are chosen once and for all
- An extensive game - focuses on the actions of individuals, that plans may be revised as they are carried out
- A coalitional game - focuses on the outcomes that can be achieved by groups of individuals; considers situations in which actions are chosen once and for all.
- A theory that specifies a set of outcomes for a model is referred to as a solution.

Chapter 2:

- A Strategic Game is a model of interacting decision-makers referred to as players. Each player has a set of possible actions preferences about the action profile—the list of all the players' actions.
- A strategic game (with ordinal preferences) consists of 1. a set of players, 2. for each player, a set of actions, 3. for each player, preferences over the set of action profiles.
- Aspects of both conflict and cooperation are present in:
  1) Prisoner's Dilemma - the main issue is whether or not the players will cooperate
  2) Bach or Stravinsky - the players agree that it is better to cooperate than not to cooperate, but disagree about the best outcome.
- Purely conflictual:
  3) Matching Pennies
- win-win is preferred over win-lose:
  4) Stag Hunt
- Ex 17.2 - Players (going in opposite directions) can drive either on the right or the left of the road.

	Left	Right
Left	(0,0)	(1,1)
Right	(1,1)	(0,0)