賽局論作業

Please read sections 15.1–15.3, 21.2, 21.4.

1. Reconsider the poker game between Alice and Bob in the textbook with a deck of 4 cards: $A > K > Q > J$. They are risk-neutral. Each player puts an ante of \$1 into a pot, and receives one card from the deck. Alice moves first. She can either check or raise. If she checks, then they'll compare whose card has a larger value and the winner will take \$2 from the pot. If she raises, she needs to put another \$1 into the pot and in this case, Bob has two choices: to fold or to call. If Bob folds, then Alice takes all \$3 in the pot. If Bob calls, then Bob needs to put \$1 into the pot before they compare cards. This time, the winner will take \$4 from the pot.

   (a) Suppose that in a Bayes Nash equilibrium, Alice with J never raises. In such an equilibrium what will Alice do if she has A, K or Q, and what will Bob do if he has A, K, Q or J?

   (b) In the previous problem, the presumption is that Alice with J never raises. But under this presumption, does a Bayes Nash equilibrium really exist?

2. 21.11.13

3. Consider a duopoly with Cournot (quantity) competition. The market demand is:
$$q = 100 - p,$$
where q and p are the quantity and the price, respectively. The unit cost of each firm is a constant: \$10. So, given the opponent's output q_j, firm i considers to:
$$\max_{q_i}(90 - q_i - q_j)q_i.$$
Please solve for the Cournot equilibrium (or Nash equilibrium).

4. Reconsider the previous problem. It is common knowledge that the unit cost of firm 1 is \$10. But now, the constant unit cost of firm 2 could be either \$10 or \$20. Firm 2 knows its own cost. Firm 1 considers the unit cost of firm 2 to be \$10 or \$20 with equal probabilities. Please calculate firm 1's output in a Bayes-Nash equilibrium.