Problem 1

Consider the following game. There are two players, Shannon and Jake. Both want the parking space in front of their house, but Shannon gets there a split second earlier. She can first start to move toward the space. After observing her decision, Jake can decide if he wants to move toward the space. If they both move toward the space, they both get a payoff of -1 – they spend time arguing over who "deserves" the space. If only one of them moves toward the space the one who moves toward the space gets a payoff of 3 and the other one gets 1. If neither move toward the space they both get 2 (each person doesn't get the space, but they remain friends.)

Part A Draw the extensive form of the game.

Part B What are all the strategies for Shannon and Jake?

Part C Draw the normal form of the game.

Part D What are all the Nash equilibria of the game?

Part E Suppose Shannon knows Jake, and his preferences very well. She can correctly predict what decisions Jake will make, and that he will never intentionally choose a worse outcome for himself. Under this assumption, are all the Nash equilibria equally reasonable? If not, which one(s) are more reasonable than others? Why?

Problem 2

Consider a $3 \times 3 \times 3$ Lewis signaling game. There are three states of the world (state 1, state 2, and state 3), three potential signals (signal A, signal B, and signal C), and three actions (act 1, act 2, and act 3). For each state of the world there is a unique action that is best for both players and each action is best in a different state. If the receiver takes the right action given the state both players get a payoff of 1, if the receiver takes one of the two wrong actions both get a payoff of 0.

Suppose the probabilities of the states are equal.

Part A. Illustrate a *signaling system* equilibrium where the state is perfectly communicated. Show that what you illustrate is an equilibrium of the game.

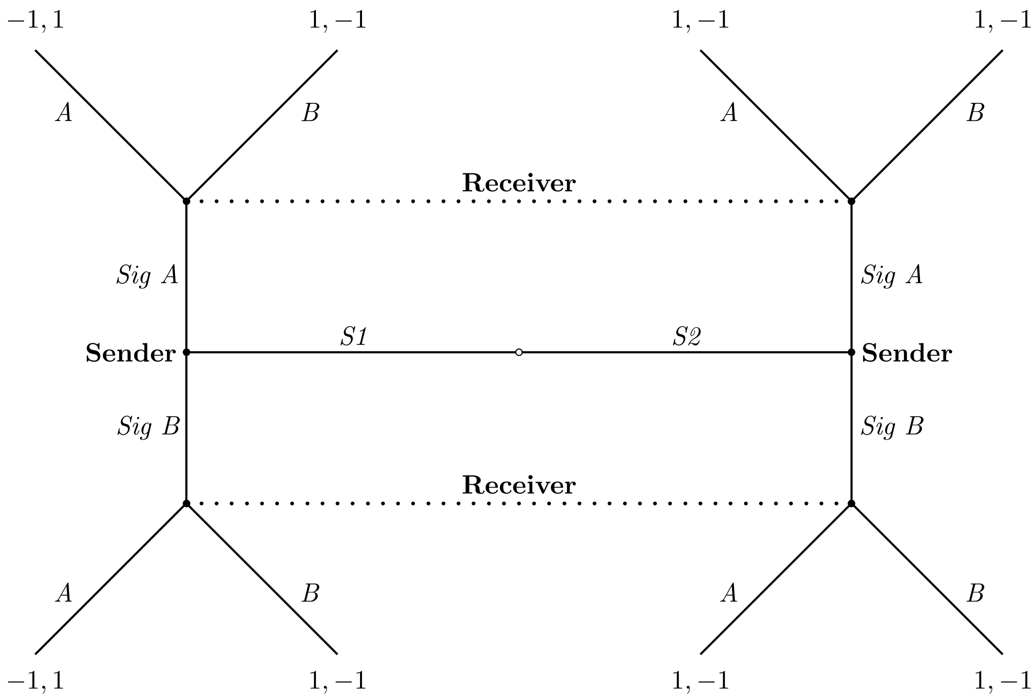
Part B. Illustrate a *pooling* equilibrium where no information is communicated. Show that what you illustrate is an equilibrium of the game.

Part C. Consider the following strategies. The sender sends signal A in state 1 and state 2, and sends signal B in state 3. The receiver will take action 1 when she receives signal A, action 3 when she receives signal B, and action 2 when she receives signal C. Is this a Nash equilibrium of the game? Show why it is, or provide a better response for one of the players if it is not.

Part D Consider these strategies. The sender sends signal A in state 1 and state 2. In state 3, the sender sends signal B with probability 1/2 and signal C with probability 1/2. If the receiver receives signal B or signal C, she takes action 3. If she receives signal A she chooses action 1 with probability 1/2 and action 2 with probability 1/2. Is this a Nash equilibrium of the game?

Problem 3

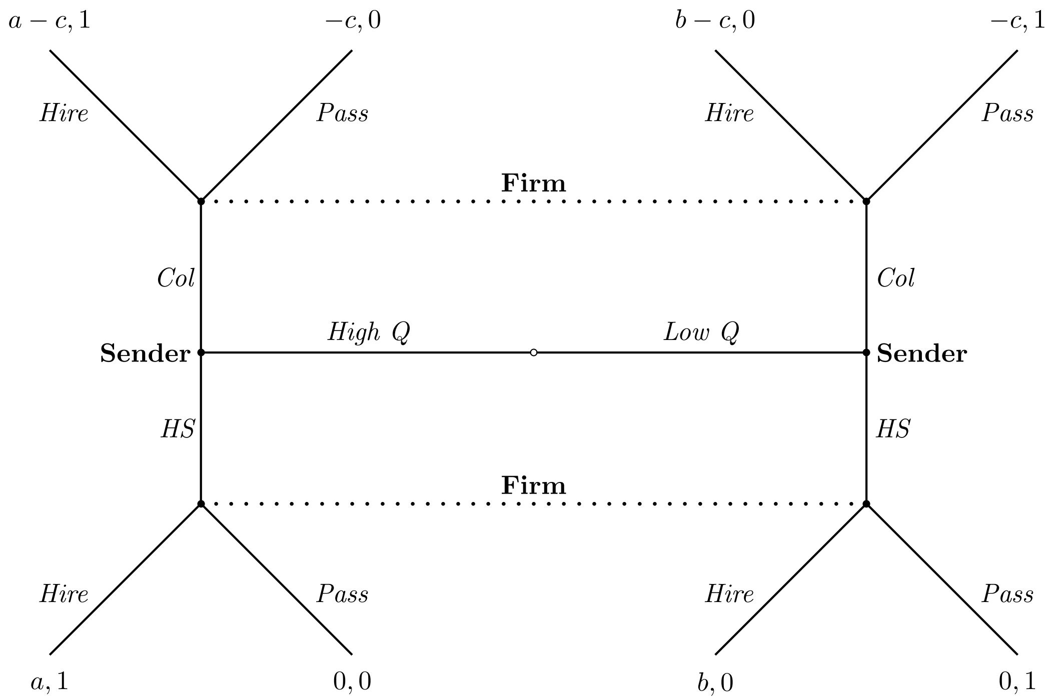
Here is a total conflict of interest signaling game.



What are all the pure strategy Nash equilibria of this game?

Problem 4

Consider this signaling game:



Part A Under what conditions (values for a, b, c, and the probability of the types) does the equilibrium (*Never signal*, *Always hire*) exist?

Part B What about ((*Never signal*, *Always pass*)?

Part C What about the signaling equilibrium (*Signal if High Quality*, *Hire if signal*)?

Part D Are there any other pure strategy Nash equilibria?