1. Consider the following “all pay” auction. An envelope containing $1.75 is auctioned according to the following rules. Dave chooses first between passing and bidding 50 cents. If Dave passes, then Melissa chooses between passing and bidding 50 cents. If Dave starts with a bid of 50 cents then Melissa chooses between passing and bidding $1. If Dave starts by passing and Melissa follows by bidding 50 cents then Dave has a choice between passing and bidding $1. These are the only possible plays. The game ends when the last player to move passes or when the last player to move bids $1. If both players pass, nobody gets anything; otherwise the player with the higher bid gets the envelope and all bidders must pay the amount of their last bid (thus even the loser). Bids are public, so there is perfect information.

   (a) Draw the extensive game.

   (b) Write the corresponding strategic form

   (c) Find all the (pure-strategy) Nash equilibria.

   (d) Solve the game using backward induction.

   (e) Is there an advantage in being the first or the last bidder? That is, if you were to play this game, would you prefer to be the first bidder or the second bidder?

2. Consider the following game. Firm A decides whether or not to enter firm B’s industry (at the moment firm B is the only firm in that industry). Firm B observes this decision. If firm A enters, then the two firms simultaneously decide whether or not to advertise. If firm A does not enter, then firm B decides alone whether or not to advertise. With two firms in the market, the firms earn profits of $3 million each if they both advertise and $5 million each if they both do not advertise. If only one firm advertises, then it earns $6 million while the other firm earns $1 million. When firm B is alone in the industry it earns $4 million if it advertises and $3.5 million if it does not advertise. Firm A earns zero profits if it does not enter.

   (a) Represent the game in extensive form.

   (b) Write the corresponding normal (or strategic) form.

   (c) Find all the pure-strategy Nash equilibria.

   (d) Find the subgame-perfect equilibria. [Answer this question only if the notion of subgame-perfect equilibrium has already been covered in class.]