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SI301/Romero

Assignment 6

6.11 Problems:

6.

a.) Pure strategy Nash equilibrium = DR

b.) Pure strategy Nash equilibrium = UL

c.) Pure strategy Nash equilibria = DL, UR

A plays U with probability p and D with probability p-1

B plays L with probability q and R with probability 1-q

Mixed strategy Nash equilibrium = (p,q) = (1/3,1/2)

7.

a.) Pure strategy Nash equilibrium = DR

b.) No pure strategy Nash equilibria are found in this game.

A plays U with probability p and D with probability p-1

B plays L with probability q and R with probability 1-q

Mixed strategy Nash equilibrium = (p,q) = (1/3,2/3)

8.

a.) Pure strategy Nash equilibria = (U,L) ; (D,R)

b.) A plays U with probability p and D with probability p-1

B plays L with probability q and R with probability 1-q

Mixed strategy Nash equilibrium = (p,q) = (4/5,4/5)

In this coordination game, it is risky for each player to play a strategy leading to a Nash equilibrium, because if the other player does not coordinate, both players end up with 0. So, players may choose a mixed strategy.

c.) DR is the more likely equilibrium. Intrinsically, players lean towards the equilibrium that yields the highest payoff for both players according to the Schelling focal point theorem.

9.

a.) Pure strategy Nash equilibrium = DR

A plays U with probability p and D with probability p-1

B plays L with probability q and R with probability 1-q

Mixed strategy Nash equilibrium = (p,q) = (3/4,1/4)

b.) There are no pure strategy Nash equilibria in this game.

A plays U with probability p and D with probability p-1

B plays L with probability q and R with probability 1-q

Mixed strategy Nash equilibrium = (p,q) = (3/4,3/4)

14.

a.) There are no pure strategy Nash equilibria in this game.

A plays U with probability p and D with probability p-1

B plays L with probability q and R with probability 1-q

Mixed strategy Nash equilibrium = (p,q) = (3/4,1/4)

This logic is flawed because it does not consider player 2’s payoff matrix. Player 2 knows that an off-diagonal result will yield a 0. So, because player 2 does not have a dominant strategy, player 1 can assume that player 2 will play a mixed strategy. And, the best response to a mixed strategy is a mixed strategy. In this case, the Nash equilibrium for a mixed strategy results in player 1 playing U more than D.

8.4 Problem 2:

2.

a.)

b.) The Nash equilibrium value of x is 40.

c.) Nash equilibrium = (Travelers on new route I = 50, travelers on new route II = 50).

d.) Total travel time at equilibrium slows down 20 minutes because of the new road. This is an example of Braess’s paradox.

e.) If 79 travelers take the highway route and one takes the local route, the total travel time is 142 minutes, which is faster than 220 minutes (the original Nash equilibrium). Because the highway route will take any number of travelers 60 minutes to reach the destination, assigning as many as possible to that route reduces travel time.

9.8 problems:

2.

a.) Considering all possible bid combinations in this auction, 75% of the possibilities will result in a revenue of 1, while 25% of the possibilities result in a revenue of 3. So, 3(1/4) + 1(3/4) = 6/4.

b.) Seller’s expected revenue = .5(3) + .5(1) = 2.

c.) If there is a tie in the auction, and the tying bids are the highest bids, the highest bid is the price. When there are more bidders, there are more ties and a higher chance of the previously stated situation. So, more bidders change the seller’s expected revenue.

3.

a.) Considering all the possible bid combinations, 75% of the possibilities result in a revenue of 0, while 25% result in 1. Therefore, 0(3/4) + 1(1/4) = ¼

b.) If there are three bidders, the seller’s expected revenue is 50 cents.

c.) The expected value is the sum of the probability of a revenue level (the resulting seller’s revenue). Because no revenue level can be greater than the number of possible bids, the fraction can never be greater than 1, but will get as close as possible as number of bidders grows.

5. Yes, buyers should bid their true value of the object. The seller entering the auction acts as another buyer, as he does not know the private values of the other buyers. s

7.

a.) You should still bid vi, as it is still a dominant strategy. Those who bid 0 are essentially taking themselves out of the auction. Because the number of bidders does not affect bidder i’s strategy, bidder i should still bid her true value.

b.) This auction has basically become a sealed-bid, first price auction. Therefore, the dominant strategy is shading your bid slightly from your true value.

Assignment 6 problems:

4. No, bidding your true value is not always a dominant strategy. For example, there is a sealed-bid, third-price auction with three bidders. Bidder i has a true value of vi. In this case, vi would lose the auction, but b’i > vi would win. The other bidders bid bj and bk. Say b’i > bj > vi > bk. Bk is the lowest bid and will be the item’s price if i bids b’i. The payoff for i would be vi-bk > 0, which is a stronger bid than i’s true value.

5.

a.) 2v(you). If your true value is v(you), and you know there is a 50% discount on the final price, bidding v(you), in the end, is only half of your actual true value. So, you can raise your bid to 2v(you), maintaining your original true value and increasing your chance of winning the auction.

b.) At least 3v(you). If everyone raises their bid by three times, and you keep your true value, there is a greater chance that you lose the auction. Assuming that your true value is not drastically different than everyone else’s original bid, joining in on everyone’s strategy should keep you in the running.

c.) Yes. Regardless of what your original bid was, the aggressive competitor will bid more. If you do not increase your bid, you are guaranteed to lose the auction.