

Name: _____

Quiz #4 – EconS 527 (October 3rd, 2018)

Question #1 (100 Points)

In the Hollywood movie “A Beautiful Mind”, Russel Crowe plays John Nash who developed the Nash Equilibrium concept in his PhD thesis at Princeton University. In one of the early scenes of the movie, Nash finds himself in a bar with three of his fellow (male) mathematics PhD students when a group of five women enters the bar. The attention of the students is focused on one of the five women, with each of the four PhD students expressing interest in asking her out. Suppose we simplified the example to one in which it was only Nash and one other student encountering a group of two women. We then have two pure strategies to consider for each PhD student: Pursue woman A or pursue woman B. Suppose that each viewed a date with woman A as yielding a “payoff” of 10 and a date with woman B as yielding a payoff of 5. Each will in fact get a date with the woman that is approached if they approach different women, but neither will get a date if they approach the same woman in which case they both get a payoff of 0.

1. Write down the payoff matrix of this game (Normal form game). **25 Points**
2. Write down the best-response functions of Nash and the other student. What are the pure strategy Nash Equilibria of this game? **35 Points**
3. Draw the game tree for this game (extensive form game). What is the Subgame Perfect Nash equilibrium of this game? **40 Points**

		Other Student	
		Woman A	Woman B
Nash	Woman A		
	Woman B		

Solution

1.[25 Points]

		Player 2	
		A	B
Player 1	A	0,0	10,5
	B	5,10	0,0

2. [35 Points]

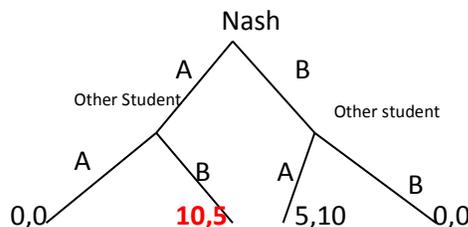
The best response function is:

$$R^{Nash}(a^{OS}) = \begin{cases} A & \text{if } B \\ B & \text{if } A \end{cases}$$

$$R^{OS}(a^{Nash}) = \begin{cases} A & \text{if } B \\ B & \text{if } A \end{cases}$$

The pure strategy equilibria of this game are {A,B} and {B,A} — where the first action in each pairing is Nash’s strategy and the second action is the other student’s strategy.

3. Assume that Nash is the first mover[40 Points]:



The SPNE is {(A,B)}. (First mover advantage!)