Youngberg

Econ 304—Bethany College

**Homework 03**

Answer all the following on a ***typed, stapled*** (if applicable)separate sheet of paper. Make sure that you justify your answers, use your own words, and show your work. All questions are equally weighted.

1. Using backward induction, solve the following game. Show your work.

Ray

2,4

Big

Small

Frank

4,2

4,1

1,4

High

Low

Low

Frank

High

Ray

2,4

Big

Small

Frank

4,2

4,1

1,4

High

Low

Low

Frank

High

*Here, the rollback equilibrium is Ray playing Big and Frank playing Low, achieved through backwards induction. Frank prefers Low when Ray plays Big (4 > 2) and he prefers High when Ray plays Small (4 > 1). Knowing how Frank will react, Ray chooses between 1 by playing Small and 2 by playing Big. Big is better, so we get Big and Low.*

1. Does the game from the previous question have a mover advantage? If so, what? Show your work.

*Then we reverse the game. And do it again.*

Ray

4,1

Big

Small

Frank

2,4

1,4

4,2

Low

High

Big

Small

Ray

Ray

4,1

Big

Small

Frank

2,4

1,4

4,2

Low

High

Big

Small

Ray

Ray

4,1

Big

Small

Frank

2,4

1,4

4,2

Low

High

Big

Small

Ray

*When Frank moves first, he gets a payoff of 2; when he moves second, he gets a payoff of 4. When Ray moves first, he gets a payoff of 2; when he moves second, he gets a payoff of 2.*

*Thus there is a second-mover advantage.*

1. In *A Beautiful Mind*, the story of John Nash, Nash is at a bar with several male friends. There are several brunette women and one blonde. All men prefer the blonde. Nash Equilibrium is described as:

If we all go for the blonde and block each other, not a single one of us is going to get her. So then we go for her friends, but they will all give us the cold shoulder because no one likes to be second choice. But what if none of us goes for the blonde? We won't get in each other's way and we won't insult the other girls. It's the only way to win.

This is quite possibly the worst description of Nash Equilibrium ever written. Why is this not Nash Equilibrium?

*This is not Nash Equilibrium because at least one player (i.e. the men) will want to change their strategy, holding the strategy of the others constant. By definition, Nash Equilibrium is when* ***no*** *player wishes to change strategy holding the strategy of other players constant.*

1. Consider the Neanderthal, Oog, and the *homo sapien*, Vladimir. When they see each other, they can get a weapon ready or show some items to trade. Of course, showing an item to trade (or showing that you are unarmed) puts you at a disadvantage in combat. Find Nash Equilibrium and any dominant strategies. Indicate if the strategies are strictly or weakly dominant and justify your answer.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Oog** | |
|  |  | *Fight* | *Trade* |
| **Vladimir** | *Fight* | -1 , -1 | 7 , -7 |
| *Trade* | -7 , 7 | 4 , 4 |

*Nash equilibrium is Fight//Fight. Fight is each player’s strictly dominant strategy: Oog gets -1 (more than -7) by Fighting when Vladimir Fights and he gets 7 (more than 4) by Fighting when Vladimir Trades. Since his payoffs are always higher by Fighting, Fighting is strictly dominant. The same goes for Vladimir.*

1. In class we discussed examples of a grim strategy and of a tit-for-tat strategy. Provide an additional example of each we did not use in class. Do not make them hypothetical (though an example from a novel or other fiction is fine).

*The Greece is on the brink of fulfilling a grim strategy. If Greece fails to cooperate with the rest of the Euro-zone and doesn’t adopt austerity measures it will be ejected from the zone, probably never allowed to re-enter in the foreseeable future.*

*Fines are a form of tit-for-tat. Fail to cooperate with the government and decide to litter and the government will betray you once for each violation and tax you a single, large amount. If only more taxes were like this.*