Youngberg

Econ 280—Bethany College

**Homework 06**

Answer all the following on a ***typed, stapled*** (if applicable)separate sheet of paper. You do not need to type equations and graphs. I charge 25 cents to staple your homework. Make sure that you justify your answers, use your own words, and show your work. All questions are equally weighted.

1. Consider the Neanderthal, Oog, and the *homo erectus*, 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. It is also the strictly dominant strategy for both players. For each player, it is* ***always*** *better to Fight, regardless of what the other player does (-1 > -7 and 7 > 4).*

1. We can think of the tragedy of the commons as a prisoner’s dilemma. Suppose two people, Chloe and Valentine, run a community garden together. They share all vegetables equally regardless how much each contributes to the weeding. Obviously more weeding means higher yields and less weeding decreases total yields. Of course, weeding is tough work and each would prefer to reap the benefits without the work. Thus each has an incentive to not weed the garden and reap meager rewards. How does a repeated game (perhaps by playing the game each summer or each month) solve this prisoner’s dilemma?

*The most important way to approach this is trigger strategy. We also discussed leadership as a way to combat the prisoner’s dilemma but it doesn’t really work here since it involves an asymmetry between players that doesn’t exist. It also doesn’t require repeating the game. Rewarding/punishing could also solve the dilemma but, like leadership, it doesn’t require repeating the game. It just changes the payoff matrix.*

*In a trigger strategy, if one player shirks on working then in future games the other player can punish by also shirking. If Chloe doesn’t weed, Valentine can punish her (and himself) by not weeding in the following game. Fearing punishment, Chloe will weed.*

*How many games you will punish the other player depends on your attitude. A tit-for-tat strategy, where you punish once for each betrayal, is soft enough that cooperation can persist in the long-run even if one player might betray the other. In a grim strategy, a single betrayal would lock the players into a shirking equilibrium, never to cooperate again. This doesn’t mean that tit-for-tat is “better:” the intensity of the grim strategy is extra incentive to avoid shirking.*

*In everyday life, cheating on a spouse is usually fought not by tit-for-tat (cheating just once right back) but a grim strategy (cheating forever, or getting a divorce). But in this scenario, a tit-for-tat might be better since it is understandable to mistakenly not be able to weed and both parties recognize it would be tragic to be locked into an inferior equilibrium due to an honest mistake.*

1. Consider the following game:

Ray

2,4

Big

Small

Frank

4,2

4,1

1,4

High

Low

Low

Frank

High

Determine rollback equilibrium. Justify your answer.

*Here, the result 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. Rewrite the game in Question 3 by reversing the order of play. Find rollback equilibrium. Is there a first or a second mover advantage in this game? How do you know?

Ray

1,4

Big

Small

4,2

4,1

2,4

High

Low

Frank

Ray

Big

Small

*Ray will play Big if Frank plays High (4 > 1) and Ray will play Small if Frank plays Low (4 > 2). Since 2 > 1, Frank will play High, causing the result to be High, Big.*

*Here we see a 2nd mover advantage: Frank’s payoff went from 4 as a 2nd mover to 2 as a 1st mover and Ray’s payoff increased from 2 as a 1st mover to 4 as a 2nd mover. Since payoffs are larger for a player when he moves first compared to when he moves 2nd, there is a 2nd mover advantage.*

1. In 2011, Google released a competitor to Facebook: Google+. What type of good are Facebook and Google+? Why is it going to be hard for Google+ to become a serious rival to Facebook?

*Both Facebook and Google+ are network goods: the more people that use them, the more valuable they become (note that since it is not the case that the value to one type of person depends on if another type of person consuming the good, they are not platform goods). Unfortunately for Google+, Facebook has 1st mover advantage here. Everyone is already on Facebook so we seem to be locked in this coordination game in the Facebook/Facebook equilibrium. Moreover, the switching costs are also high, since moving your photos takes a lot of time and effort. Still, they are not unreasonably high: creating a new social networking site is not as unreasonable as creating a new measurement standard.*