Microeconomics 3: Game Theory
Spring 2021

Problem Set 2

1. A game is called a potential game if all player's incentives can be summarized by a single function. Specifically, a function $\phi : S \to \mathbb{R}$ exists such that

$$\phi(s_i, s_{-i}) - \phi(s_i', s_{-i}) = u_i(s_i, s_{-i}) - u_i(s_i', s_{-i})$$

   (a) Show that $\phi(y_1, y_2) = \ln(1 - y_1) + \ln(1 - y_2) + \ln(y_1 + y_2)$ is a potential function for the game in problem set 1 question 2.

   (b) Show that if S is compact and ϕ is continuous then a potential game has pure strategy Nash Equilibrium (hint: What can you say about $\phi(s)$ if s is a NE?)

2. Consider the following game tree

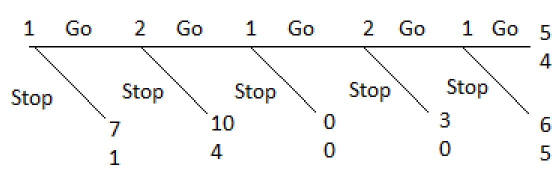

Figure 1: Game Tree for Problem 4

   (a) What is the reduced normal form of this game.

   (b) What are the pure strategy Nash equilbria?

   (c) What are the subgame perfect Nash equilibria?

3. Consider the following game tree

   (a) What is the reduced normal form of this game.

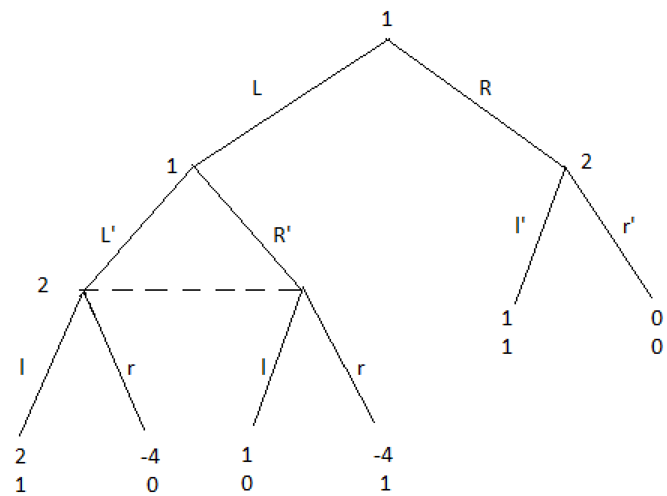

Figure 2: Game Tree for Problem 5

(b) What are the pure strategy Nash equilbria?

(c) What are the subgame perfect Nash equilibria?