# OR 3: Chapter 9 - Finitely Repeated Games

## Recap

In the [previous chapter](Chapter_08-Subgame_Perfection.html):

* We looked at the connection between games in normal form and extensive form;
* We defined a subgame;
* We define a refinement of Nash equilibrium: subgame perfect equilibrium.

In this chapter we'll start looking at instances where games are repeated.

## Definition of a repeated game

* Definitions
* Description of strategy

## Subgame perfect Nash equilibrium in repeated games

### Theorem

For any repeated game, any sequence of stage Nash profiles gives the outcome of a subgame perfect Nash equilibrium.

If we consider the strategy given by:

"Player should play strategy regardless of the play of any previous strategy profiles."

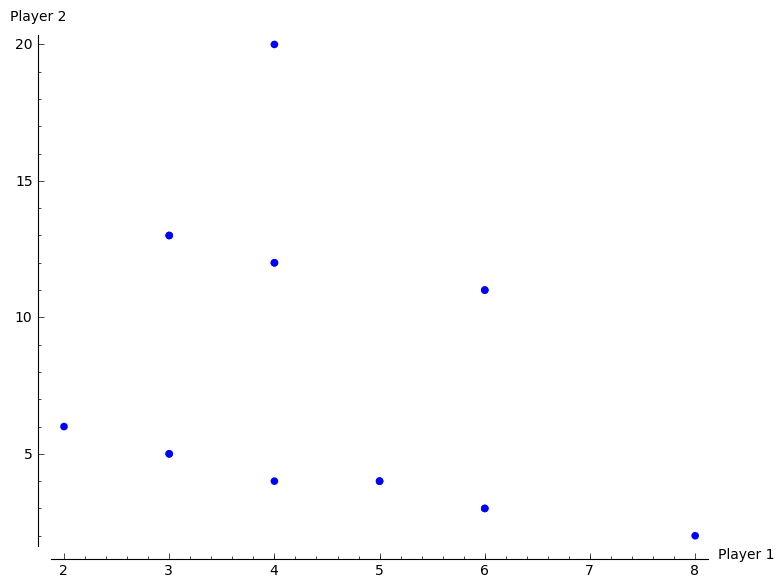
where is the strategy played by player in any stage Nash profile. The is used to indicate that all players play strategies from the same stage Nash profile.

Using backwards induction we see that this strategy is a Nash equilibrium. Furthermore it is a stage Nash profile so it is a Nash equilibria for the last stage game which is the last subgame. If we consider (in an inductive way) each subsequent subgame the result holds.

### Example

Consider the following stage game:

The following plot shows the various possible outcomes of the repeated game for :



If we consider the two pure equilibria and , we have 4 possible outcomes that correspond to the outcome of a subgame perfect Nash equilibria:

Importantly, not all subgame Nash equilibria outcomes are of the above form.

## Reputation in repeated games

* Give example (Try above game but be ready to use a different one) of a reputation based strategy that is not a stage equilibria but is subgame perfect.