Problem 4 – Report

For project repository, please check: <https://github.com/DariMe20/Game-Theory-Applications>

**Game Description:**

This game is based on a **perfect information extensive form**, where two players alternate making moves.

The game consists of an even number of rounds, and each player has the option to either **continue** or **stop** the game at each round.

The players alternate turns, with Player 1 starting first in the odd-numbered rounds and Player 2 in the even-numbered rounds. The payoffs at each leaf are determined by the game’s structure.

The objective of the game is for each player to maximize their payoff by choosing whether to stop or continue at each stage, taking into account the payoffs for each round. The game ends when one player chooses to stop, and the other player receives a reduced payoff.

Using **Backward Induction (SPNE)**, we calculate the Subgame Perfect Nash Equilibrium to determine the optimal decisions for both players and when the game will end.

**Algorithm Results**

**Example 1**

number of rounds (n): 4

Payoff enter type: random

Random payoffs generated:

Player 1's payoffs (L): [9, 1, 5, 2]

Player 2's payoffs (R): [2, 9, 4, 7]

Result:

**Game ends at round 1 by Player 1. Payoffs are ((9, 2))**

**Example 2:**

number of rounds (n): 4

Payoff enter type: Manual

Player 1's payoffs (L): [0, 1, 4, 3]

Player 2's payoffs (R): [0, 2, 1, 4]

**Game ends at round 2 by Player 2. Payoffs are ((1, 2)**

**Example 3:**

Number of rounds (n): 10

Payoff enter type: random

Random payoffs generated:

Player 1's payoffs (L): [3, 8, 8, 3, 7, 8, 7, 5, 5, 8]

Player 2's payoffs (R): [4, 6, 5, 6, 6, 2, 7, 1, 7, 3]

**Game ends at round 2 by Player 2. Payoffs are ((8, 6)**