

GAME THEORY - ASSIGNMENT 5

Due date: **October 22, 2025.**

1. The stage game is shown in Table 1.

	H	L
H	(3, 1)	(0, 0)
L	(1, 2)	(5, 3)

Table 1: Stage game

Consider the infinite repetition of the game in Table 1 with discounted criterion to evaluate payoffs. Find a subgame perfect equilibrium of this game such that

- (a) the equilibrium payoff of Players approach $(4, 2)$ as $\delta \rightarrow 1$.
 - (b) the equilibrium payoff of Players approach $(3, 2)$ as $\delta \rightarrow 1$.
2. If we repeat prisoner's dilemma game for two periods, how many strategies does each player have in this repeated game?
3. Consider the stage game G shown in Table 2.

	a	b	c
A	(4, 4)	(-1, 5)	(2, 2)
B	(5, -1)	(1, 1)	(2, 2)
C	(2, 2)	(2, 2)	(3.5, 3.5)

Table 2: Stage game

- (a) Find the worst Nash equilibrium (pure action) for each player in G and the corresponding payoffs.
- (b) Consider G^2 : the finitely repeated game, where G is repeated for two periods.
 - (i) Is there a subgame perfect equilibrium of G^2 where (A, a) is played in the first period? Explain your answer.
 - (ii) Is there a Nash equilibrium of G^2 where (A, a) is played in the first period? Explain your answer.

- (c) Consider the infinitely repeated game G^∞ . Describe a carrot and stick strategy profile where punishment is carried out for one period and (A, a) is played in normal state. Show that it is a subgame perfect equilibrium strategy profile and find the corresponding discount factor.
4. Suppose instead of discounting criterion for evaluating payoffs, we evaluate payoff of Player i from a stream of payoffs $\{v_i^t\}_1^\infty$ as

$$\lim_{T \rightarrow \infty} \frac{1}{T} \sum_{t=1}^T v_i^t.$$

	C	D
C	(2, 2)	(0, 3)
D	(3, 0)	(1, 1)

Table 3: Prisoner's dilemma

Verify if the trigger strategy continues to be the Nash and subgame perfect equilibrium of the Prisoner's Dilemma game of Table 3 using this criterion for evaluating payoffs.