GAME THEORY - ASSIGNMENT 4

Due date: **October 28, 2022**.

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 $\delta \to 1$.

(b) the equilibrium payoff of Players approach $(3,2)$ as $\delta \to 1$.

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

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

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

Table 3: Prisoner's dilemma

Verify if the grim-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.