Problem 18				
Player 2				
	А	В		
A G	6, 6	0, <u>12</u>		
B A A	<u>12</u> , 0	<u>1</u> , <u>1</u>		
Trigger Strategy for this game is: Period 1: Play A Period t: If in every earlier period we have each played A, then play A. If in any previous period either of us have ever played B, then B. • $\pi^1_{cooperating} \ge \pi^1_{cheating} \implies \frac{6}{1-\delta} \ge 12 + \frac{\delta}{1-\delta}$ Player 1 will cooperate so long as $\delta \ge \frac{6}{11}$ • $\pi^2_{cooperating} \ge \pi^2_{cheating} \implies \frac{6}{1-\delta} \ge 12 + \frac{\delta}{1-\delta}$ Player 2 will cooperate so long as $\delta \ge \frac{6}{11}$				
The trigger strategy will be a Nash equilibrium if $\delta \geq \frac{6}{11}$.				

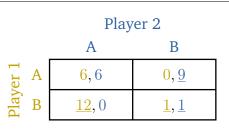
Problem 19

	Player 2		
	А	В	
er 1 V	2, 2	<u>0, 5</u>	
Player B	5, 0	<u>4</u> , <u>4</u>	

Cooperation is advantageous when a NE is Pareto-inefficient. However, in the above game, there's no outcome better for both of the players than if each follow their own self-interests. They are not cooperating.

Problem 20				
Player 2				
	А	В	_	
er 1	6, 6	<u>0, 12</u>		
Player 1 V	<u>12</u> ,0	<u>1,4</u>]	
Trigger Strategy for this game is: Period 1: Play A Period 1: If in every earlier period we have each played A, then play A. If in any previous period either of us have ever played B, then B. • $\pi^{1}_{cooperating} \ge \pi^{1}_{cheating} \implies \frac{6}{1-\delta} \ge 12 + \frac{\delta}{1-\delta}$ Player 1 will cooperate so long as $\delta \ge \frac{6}{11}$				
• $\pi^2_{cooperating} \ge \pi^2_{cheating} \implies \frac{6}{1-\delta} \ge 12 + \frac{4\delta}{1-\delta}$				
Player 2 will cooperate so long as $\delta \geq \frac{3}{4}$				
The trigger strategy will be a Nash equilibrium if $\delta \geq \frac{3}{4}$.				

Problem 21



Trigger Strategy for this game is:

Period 1: Play A

Period t: If in every earlier period we have each played A, then play A. If in any previous

period either of us have ever played B, then B.

• $\pi^{1}_{cooperating} \ge \pi^{1}_{cheating} \implies \frac{6}{1-\delta} \ge 12 + \frac{\delta}{1-\delta}$ Player 1 will cooperate so long as $\delta \ge \frac{6}{11}$

•
$$\pi^2_{cooperating} \ge \pi^2_{cheating} \implies \frac{6}{1-\delta} \ge 9 + \frac{\delta}{1-\delta}$$

Player 2 will cooperate so long as $\delta \ge \frac{3}{8}$

The trigger strategy will be a Nash equilibrium if $\delta \geq \frac{6}{11}$.

Problem 22

Firm i = 1, 2

In equilibrium, both firms would try to maximize their payoff. Firm i's best response: $q_i^*(q_j) = \underset{q_i}{\operatorname{argmax}}(100 - q_i - q_j)q_i$

F.O.C:
$$100 - 2q_i - q_j = 0 \implies q_i^*(q_j) = \frac{100 - q_j}{2}$$

Combine $q_1^*(q_2)$ and $q_2^*(q_1)$, we get $q_1^* = q_2^* = \frac{100}{3}$ and $\pi_1^* = \pi_2^* = \frac{10000}{9}$. The Nash equilibria is $\left(\frac{100}{3}, \frac{100}{3}\right)$

Suppose the firms play this game an infinite number of times. Firm i = 1, 2 choose to {(C)ooperate, (D)eviate}

If cooperate, they maximize their payoff by: $Q^* = \underset{Q}{\operatorname{argmax}}(100 - Q)Q$ F.O.C: $100 - 2Q = 0 \implies Q^* = 50$ **Repeated Games**

$$q_1^* = q_2^* = \frac{Q^*}{2} = \frac{50}{2} = 25$$
 and $\pi_1 = \pi_2 = 1,250$

Period 1: Firm 1 and Firm 2 play C and choose quantity 25 Period t: If in every earlier period both firm play C, then play C. If in any previous period either of the firms have ever play D, then play D.

If firm i choose to deviate, then firm i's and firm j's payoff would be: $q_i^* = \underset{\alpha}{\operatorname{argmax}} (100 - 25 - q_i)q_i$

F.O.C:
$$75 - 2q_i = 0 \implies q_i^* = 37.5$$

 $\pi_1 = 1406.25$ and $\pi_2 = 937.5$

	Firm 2		
	С	D	
L C	1250, 1250	$937.5, \underline{1406.25}$	
Fin D	<u>1406.25</u> , 937.5	$\underline{1111.11}, \underline{1111.11}$	

- $\pi^{1}_{cooperating} \ge \pi^{1}_{cheating} \implies \frac{1250}{1-\delta} \ge 1406.25 + \frac{10000\delta}{9(1-\delta)}$ Player 1 will cooperate so long as $\delta > 0.5294$
- $\pi^2_{cooperating} \ge \pi^2_{cheating} \implies \frac{1250}{1-\delta} \ge 1406.25 + \frac{10000\delta}{9(1-\delta)}$ Player 2 will cooperate so long as $\delta \ge 0.5294$

The trigger strategy will be a Nash equilibrium if $\delta \ge 0.5294$.