Fall 2025
14.12 Game Theory
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Problem Set 6

Problem 1 (SPNE vs. NE)**.** In class, we showed that if a stage game G has exactly one Nash equilibrium, then for any finite horizon T, the finitely repeated game $G(T)$ has exactly one *subgame perfect Nash equilibrium*.[1] This problem considers all Nash equilibria of $G(T)$.

(a) Consider the standard prisoner's dilemma:

	C	D
C	$2, 2$	$-1, 3$
D	$3, -1$	$0, 0$

Suppose that this stage game is played in periods $t = 0, 1$. Show that in every Nash equilibrium of this repeated game, the action profile (D, D) is played in both periods.

(b) Now consider the following variant of the prisoner's dilemma:

	C	D
C	$2, 2$	$-1, 3$
D	$3, -1$	$0, 0$
E		

Suppose that this stage game is played in periods $t = 0, 1$. Fill in the payoffs in the last row so that (D, D) is still the only Nash equilibrium of the stage game

[1] Whenever we refer to a finitely repeated game, it is assumed that past actions are observed and that the payoffs in the repeated game equal the average payoffs over the periods.

but the repeated game has a Nash equilibrium in which the period-0 action profile is not (D, D).

Problem 2 (Stag hunt)**.** Recall the stag hunt game from class in which each player chooses to hunt stag (S) or hare (H):

	S	H
S	$2, 2$	$0, 1$
H	$1, 0$	$1, 1$

Consider the repeated stag-hunt game with periods $t = 0, 1$.

(a) Count the number of pure subgame perfect Nash equilibria in which (S, S) is played in period 0. Justify your answer.

(b) Count the number of pure subgame perfect Nash equilibria in which (S, H) is played in period 0. Justify your answer.

Problem 3. Exercise 12.17.

Problem 4. Exercise 12.26.

14.12 Economic Applications of Game Theory

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