

CS 381 - Notes

09/15/2026

	T	S
T	10, 10	0, 20
S	20, 0	1, 1

A strategy is dominant if it is the best strategy to play no matter what the other player does

Nash Equilibrium is a specification of strategies for all the players where no player is inclined to deviate from that strategy unilaterally.

⇒ Pollution Game

There are n states collectively in the game. Each state has the option to either a) Pay some cost to their local economy \$3 and not pollute
b) Ignore and pollute

The cost to all states is the # of states polluting

Let's say K states currently polluting. If I'm not currently polluting, I'm paying $3+K$ but if I choose

to pollute I now pay $1+k$, so it's unilaterally better for me to switch.

Chicken

	St	Sw
St	-100	-5
Sw	-5	0

n players

Each player chooses some $x_i \in (0, 1)$.

The value they get is $v_i = x_i (1 - \sum_j x_j)$

$$\Rightarrow \frac{\partial v_i}{\partial x_i} = 1 - \sum_{j \neq i} x_j - 2x_i = 0$$

$$\Rightarrow x_i = \frac{1 - \sum_{j \neq i} x_j}{2}$$

$$\text{Guess: } x_i^* = \frac{1}{2n}$$

$$\frac{\frac{2n}{2n} - \frac{n-1}{2n}}{2} = \frac{n+1}{4n}$$

$$\text{Try } x_i^* = \frac{1}{n+1}$$

$$\frac{1 - \frac{n-1}{n+1}}{2} = \frac{\frac{2}{n+1}}{2} = \frac{1}{n+1}$$

$$\Rightarrow v_i^* = \frac{1}{n+1} \left(1 - \frac{n}{n+1} \right) = \left(\frac{1}{n+1} \right)^2$$