

Loose goal: rigorously (but accessibly) summarize Nash Equilibrium?

First major result: Minimax Theorem (Von Neumann, 1928)

Then: Nash Eq. (V.N., 1950? Get name of paper & check)

↳ Nobel in 1994!

Mixed extension of fin game has  $\geq 1$  Nash Eq

Note: may need to translate! Very Econ-esque language.

Def (Decision Problem)

$(A, \leq)$  a poset

Transitive:  $a \leq b, b \leq c \Rightarrow a \leq c$   
 Reflexive:  $a \leq a$   
 Antisym:  $a \leq b$  &  $b \leq a \Rightarrow a = b$

- "Complete":  $a \leq b, b \leq a$ , or both  $\forall a, b$   
 i.e. a total order?

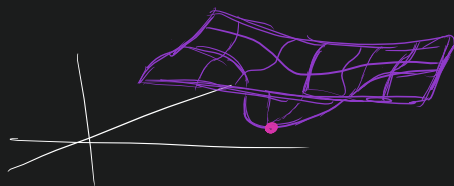
Todo: disentangle what props are used!

Walk through prisoner's dilemma in-depth!

↳ How to model IRL situation as formal maths

Nash eq: Local min (no player gains by deviating)

↳ Calc 1 ex good



$G = (A, u)$

Def: Nash eq of  $G$  is a strategy profile  $a^* \in A$  s.t.

$$\forall i \in N, \forall \hat{a}_i \in A_i, u_i(a^*) \geq u_i(a^*_{-i}, \hat{a}_i)$$

Not very illuminating. Also, why care!

Show Nash eq for prisoner's dilem.

Ex. 2.2.2: Why partial derivs?

Existence vs uniqueness!

Nash Thm ↗

Show {Nash eq} is closed

To what games will this thm apply? Need convexity

See Zero-sum games (define?)

How to interpret tables

How to find NE geometrically

Soccer ex - counterintuitive!