Econ 1052 Lecture 7 — Feb 20, 2020

Race to 100

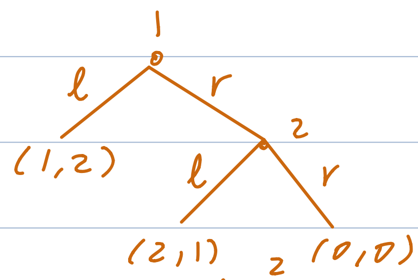
Integers 1 to 9, summing till 100

- 2nd player has win-forcing strategy
  backwards-inductive strategy

...	L	W	L	W	
...	80	81-89	90	91-99	100 ≥

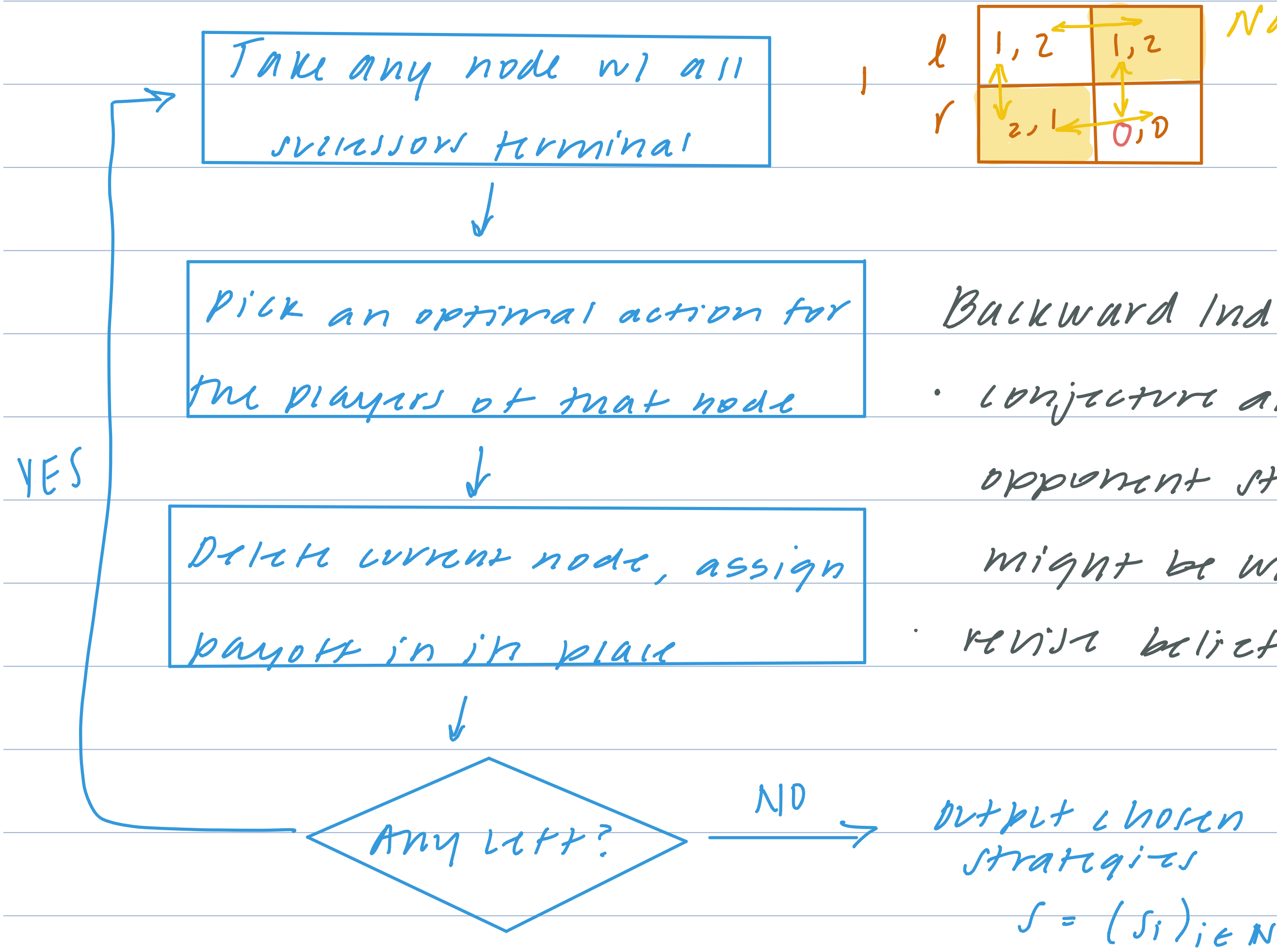
Backward Induction

- extensive games
- finite history
- perfect information



		2: l	r
1	l	1,2	1,2
	r	2,1	0,0

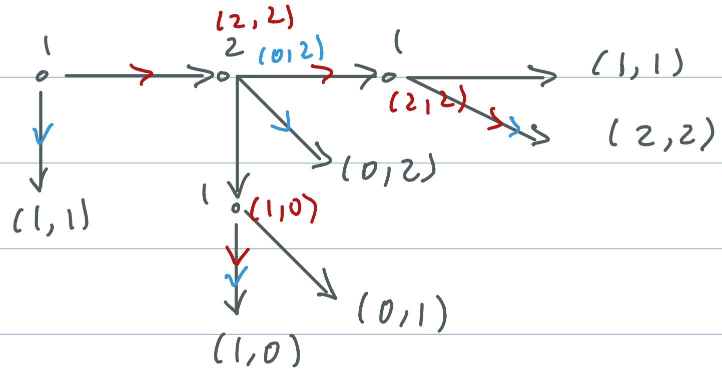
Nash Eq.



Backward Induction:

- conjecture about opponent strategy, might be wrong
- revise belief / strategy

Centipede Games



False in infinitely long games

Thm.[*] In a finite game of perfect information, every s outputted by backward induction is a Nash Equilibrium.

i.e. The backward induction strategy profiles $\subset$ NE strategy profiles

* one shot deviation principle

Pf. Let strategy profile $s = (s_i)_{i \in N}$ be output by backward induction. Take any i, any $\hat{s}_i$.

Want to show: $u_i(s_i, s_{-i}) \geq u_i(\hat{s}_i, s_{-i})$.

deviating strategy

Consider any history s.t. $P(h) = i$, $s_i(h) \neq \hat{s}_i(h)$

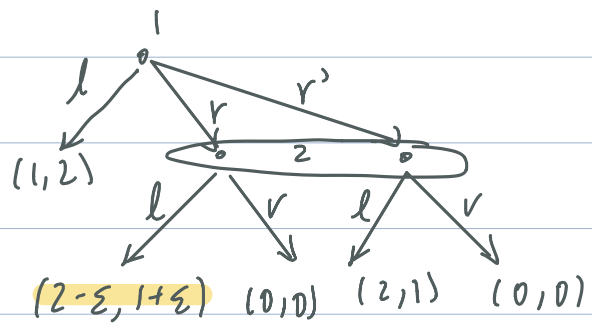
and $\forall h'$ after h, if $P(h') = i$ then $s_i(h') = \hat{s}_i(h')$.

Let $\hat{s}_i'$ be as $\hat{s}_i$ but choose $s_i(h)$ at h.

Swap output of deviating strategy for other strategy when they deviate for the last time.

$u_i(\hat{s}_i', s_{-i}) \geq u_i(\hat{s}_i, s_{-i})$

$\hat{s}_i^0 = \hat{s}_i$. $\hat{s}_i^k$ = strategy produced by changing $\hat{s}_i^{k-1}$



side bet should not interfere

w/ recursive structure

Zermello's Thm: For zero-sum games, strategy such that force win / force draw. Either win-forcing strat for one or draw-forcing strat for both.