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Matching Pennies:

P_2

	Heads	Tails
Heads	1, -1	-1, 1
Tails	-1, 1	1, -1

P_1 =

, To find Nash Equilibrium, look for games payoff initially, showing zero-sum game

∴ No Nash equilibrium exists (Pure), But, there is a Mixed strategy Nash Equilibrium

how) To find for P_1, Take P_2's Payoffs (let's say for head strategy.)

E_H = Expected utility of P_2 choosing Head

E_T = " " " P_2

$E_H = f(\sigma_H)$ Prob. that P_1 chooses Head sometimes & other times Tails $(1-\sigma_H)$

$E_H = f(\sigma_H) + (1-\sigma_H)f$

$= (-1)(\sigma_H) + (1-\sigma_H)(1)$

$= -\sigma_H + 1 - \sigma_H$

$E_H = 1 - 2\sigma_H$ — ①

$E_T = f(\sigma_H) + (1-\sigma_H)f$

where, E_T = when P_2 Chooses Tails, σ_H = Prob. that P_1 chooses Heads & $(1-\sigma_H)$, P_1 Chooses tails, So

$$E_T = (1)(\sigma_H) + (1-\sigma_H)(-1)$$

$$E_T = \sigma_H - 1 + \sigma_H = 2\sigma_H - 1 \quad (2)$$

So, $E_H = E_T \quad (3)$

$$1 - 2\sigma_H = 2\sigma_H - 1$$

$$2 = 4\sigma_H$$

$$\therefore \sigma_H = 1/2 , \quad \sigma_T = 1 - \sigma_H = 1/2$$

So, Payoff for P_1 = [0.5, 0.5]

& Similarly, Can do for P_2 considering P_1.

Tested: The output is Compared with Gambit's "enummixed" method.

Eq. (3) depicts ⇒ Expected utility for selecting "Heads" as pure Strategy = Expected utility for selecting "Tails" as pure strategy.