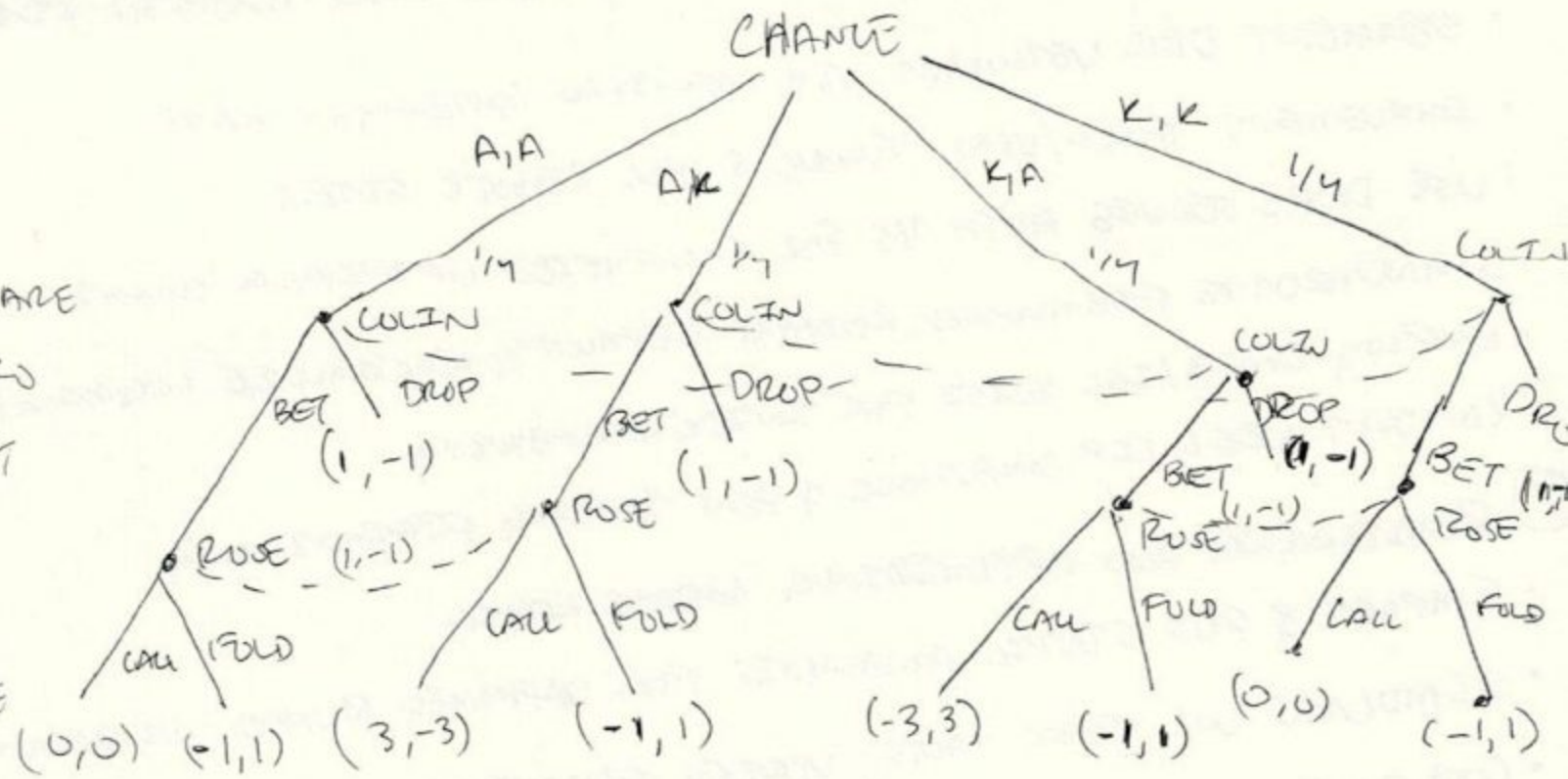
GAME TREES

EX. POKER

- NODES FOR EA. PLAYER ARE PARTITIONED INTO INFO SETS, BUT PLAYERS DON'T KNOW WHICH NODE

- THIS IS A MATRIX GAME CORRESPONDING TO GAME TREE, SO EVERY GAME TREE CAN BE REDUCED TO GAME MATRIX.



EXPECTED ROSE PAYOFF: ←

$\left(\frac{1}{4}\right)(0) + \left(\frac{1}{4}\right)(1) + \left(\frac{1}{4}\right)(-1) + \left(\frac{1}{4}\right)(1) = 1/4$

FOR OTHER 15 STRATEGIES:

COLIN BETS:	ALWAYS	A ONLY	K ONLY	NVR
ROSE ALWAYS	0	-1/4	5/4	1
ROSE CALLS A ONLY	1/4	1/4	1	1
ROSE CALLS K ONLY	-5/4	-1/2	1/4	1
ROSE NVR	-1	0	0	1

SADDLE: 1/4

PAYOFFS TO ROSE, COLIN

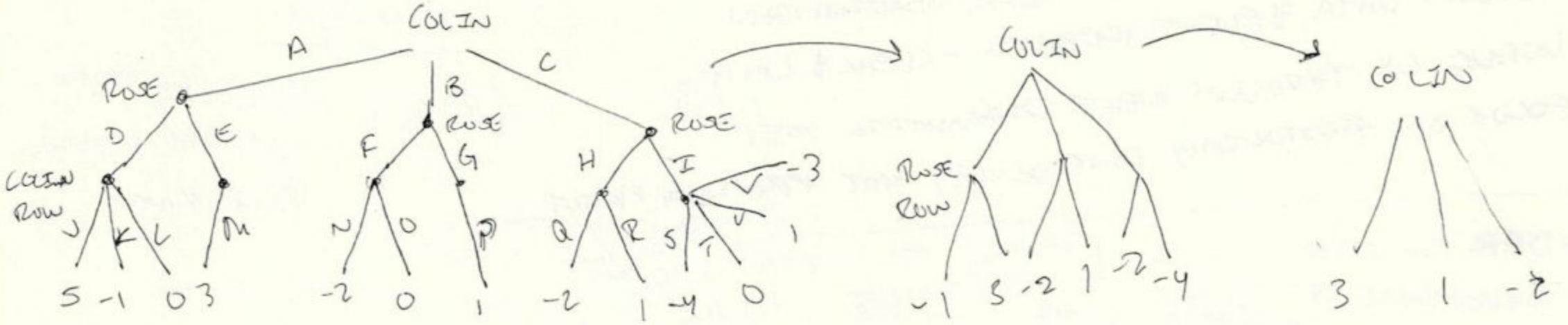
PROBABILITY	ROSE HAND, COLIN HAND	OUTCOME	PAYOFF TO ROSE
1/4	A, A	COLIN BETS, ROSE CALLS, TIE	0
	A, K	COLIN DROPS	+1
	K, A	COLIN BETS, ROSE FOLD	-1
	K, K	COLIN DROPS	+1

GAME IS SAID TO HAVE PERFECT INFORMATION

IF • NO NODES ARE LABELED CHANCE
• ALL INFO SETS CONSIST OF SINGLE NODE

ARA - CHANCE PLAYS NO ROLE

THESE GAMES CAN BE TRUNCATED



2x2, MIXED STRAT, NO SADDLE, START HAND: [ODDMENTS]

ROSE \ COLIN	A	B
A	2	-3
B	0	3

COLUMN DIFF: $2-0=2$ $-3-3=-6$

ROW DIFF: $2-(-3)=5$ $0-3=-3$

	A	B
COLIN ODDMENT	6	2
COLIN PROBAB.	6/8	2/8

ROSE ODDMENT	3
	5
ROSE PROB.	3/8
	5/8

→ LINEAR PROGRAMMING

MINIMAX THEORY: EVERY m x n MATRIX GAME HAS A SOLUTION

V = VALUE OF GAME.

i) IF ROSE PLAYS OPTIMAL, ROSE EXPECTED PAYOFF $\geq V$, NO MATTER WHAT COLIN DOES

ii) IF COLIN OPTIMAL, ROSE EXPECTED PAYOFF $\leq V$, NO MATTER WHAT ROSE DOES

EX. 1

2x2 GAME:

ROSE \ COLIN	A	B
A	a	b
B	c	d

(1.A) SHOW VALUE OF X

$$X = \frac{d-b}{(a-c)+(d-b)}$$

(VERIFY ODDMENT $|b-d|$ & $|a-c|$)

(1.B)

$$V = \frac{ad-bc}{(a-c)+(d-b)}$$