LIST OF EXERCISES

PRISONERS

A \ B	C	D
C	1,1	-1,3
D	3,-1	0,0

COOPERATIVE →

	C	D
C	1,1	-1,3
D	-3,-1	0,0

2 x PURE NASH EQUILIBRIA

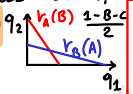
$(\mu^A = c) \to D$
$(\mu^A = D) \to C$
} NO DOMINATED ACTIONS

COURNOT DUOPOLY

NASH EQUILIBRIUM: INTERSECTION OF BEST REPLY r_i

$A_1 = A_2 = [0,\infty) \to$ QUANTITY TO PRODUCE

PRICE PER UNIT — MARGINAL PRODUCTION COST



$u_1(a_1, a_2) = a_1(\max\{0, 1-(a_1+a_2)\} - c)$

ITERATED ELIMINATIONS OF DOMINATED ACTIONS

- EACH FIRM HAS S.CONCAVE PAYOFF IN ITS QUANTITY

$$\frac{\partial u_i(q_i, q_{-i})}{\partial q_i} < 0 \iff q_i > \frac{1-q_{-i}-c}{2}$$

ELIMINATE $q_i > \frac{1-c}{2}$, TAKING $q_i \in [0, \frac{1-c}{2}]$

- $$\frac{\partial u_i(q_i, q_{-i})}{\partial q_i} > 0 \iff q_i < \frac{1-q_{-i}-c}{2}$$

$$q^i \in \left[\frac{1-c}{4}, \frac{1-c}{2}\right] \to (q^\infty) \to \frac{1-c}{3}$$

(L, M, R game)

	L	M	R
U	3,2	0,1	0,0
M	0,2	3,1	0,0
D	1,1	1,2	3,0

$$C = A_A \times A_B$$
$$\rho(C) = r_B(A_A) \times r_A(A_B)$$

- $\rho(\{U,M,D\} \times \{L,M,R\}) = \{U,M,D\} \times \{L,M\}$
  - $r_A(\{L,M,R\}) = \{U,M,D\}$
  - $r_B(\{U,M,D\}) = \{L,M\} \to$ R IS DOMINATED

  FIND BEST RESPONSES TO ONE PORTION AT A TIME

- $\rho(\{U,M,D\} \times \{L,M\}) = \{U,M\} \times \{L,M\}$
- $r_A(\{L,M\}) = \{U,M\} \to$ D IS DOMINATED
- $r_B(\{U,M\}) = \{L\} \to$ M IS DOMINATED

(B, P, F game)

	B	P	F
B	4,3	0,2	0,0
P	0,1	3,4	0,0
F	1,1	1,2	5,0

$r_A(\{B,P,F\}) = \{B,P,F\}$
$r_B(\{B,P,F\}) = \{B,P\}$

$\rho(C) = \{B,P,F\} \times \{B,P\}$

$r_A(\{B,P\}) = \{B,P\}$
$r_B(\{B,P,F\}) = \{B,P\}$

$\rho^2(C) = \{B,P\} \times \{B,P\} = \rho^\infty(C)$

BERNHEIM

	b_1	b_2	b_3	b_4
a_1	0,7	2,5	7,0	0,1
a_2	5,2	3,3	5,2	0,1
a_3	7,0	2,5	0,7	0,1
a_4	0,0	0,-2	0,0	10,-1

FASTER METHOD
1. EXCLUDE DOMINATED ACTIONS, ONCE PER PLAYER, UNTIL YOU CAN'T
2. FIND NASH EQUILIBRIA

BURGLAR?

	BURGLARISE	NO
BUY ALARM	$V-C, -P/2$	$V-C, 0$
NO	$0, V/2$	$V, 0$

- P = PERCEIVED $\mathbb{P}$(ROB)
- q = PERCEIVED $\mathbb{P}$(ALARM)

- $P \geq \frac{C}{V} \Rightarrow$ MORE ALARMS $\Rightarrow$ LESS ROBBERIES $\Rightarrow P\downarrow$
- $q = \frac{V}{V+P} \Rightarrow$ MORE ROBBERIES $\Rightarrow$ MORE THIEVES CAUGHT $\Rightarrow q\uparrow$

COORDINATION GAME

	b	p
b	3,1	0,0
p	0,0	1,2

FIND $r_B(r_A(A_B)) = A$: $\{(b,b), (p,p)\}$

1. FIX PLAYER, FIND BEST RESPONSE $\times I$ → MARK ON TABLE
2. FIND INTERSECTIONS

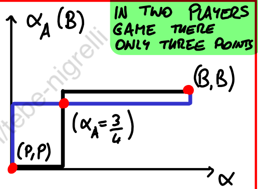
$\exists!$ MIXED NASH EQUILIBRIUM:
"A" MUST BE INDIFFERENT BETWEEN OPTIONS (OTHERWISE THEY WOULD NOT ASSIGN $p>0$ TO BOTH ACTIONS)

DO THIS ONCE PER PLAYER

FIND P ST.

$$\alpha_B(B)u_A(A,B) + (1-\alpha_B(B))u_A(B,S) = \alpha_B(B)u_A(S,B) + (1-\alpha_B(B))u_A(S,S)$$
$$\alpha_B(B) = \frac{1}{4}$$

IN TWO PLAYERS GAME THERE ONLY THREE POINTS



RIDDLE OF THE HATS
- 3 PLAYERS W. HAT
- A PLAYER ONLY SEES THE OTHER TWO
- INFORMATION

} S, Ω

MATCHING PENNIES

	H	T
H	1,-1	-1,1
T	-1,1	1,-1

NO PURE NASH. EQ.
MIXED NE AT $\frac{1}{2}A + \frac{1}{2}B$

BATTLE OF SEXES

	B	S
B	3,2	0,0
S	0,0	2,3

FIND μ^i ST.
$u_i(B, \mu^i) = u_i(S, \mu^i)$
$\mu^i(B) = 2/5$
$u_j(B, \mu^j) = u_j(S, \mu^j)$
$\leftarrow \mu^j(B) = 3/5$

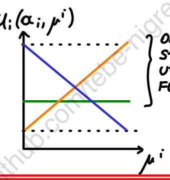
6/25	9/25
4/25	6/25

NOTE: IT'S ONE PLAYER, LOOKING FOR THE CONJECTURE ST. THEY WOULDN'T MIND PICKING EITHER

PENALTY SHOOTING

	L	R
L	4,-4	9,-9
M	6,-6	6,-6
R	9,-9	4,-4

$(\mu^A = L) \to \alpha^*_A = L$
$(\mu^A = R) \to \alpha^*_B = R$
$\alpha_A = M$ DOMINATED



ONE LINE PER STRATEGY, PLOT UTILITY AS A FUNCTION OF μ^i

TRAFFIC LIGHTS

	S	D
S	6,6	2,7
P	7,2	0,0

FIRST-PRICE AUCTION

$\vartheta_i \overset{iid}{\sim} \mathcal{U}[0,1]$ WILLINGNESS TO BUY ITEM

b_i BID.

TIES $\Rightarrow$ UNIFORM $\mathbb{P}$(WIN)

$$u_i(\vartheta_i, b) = \begin{cases} \dfrac{\vartheta_i - b_i}{|\arg\max_{j \in I} b_j|} & b_i = \max_{j \in I} b_j \\ 0 & \text{ELSE} \end{cases}$$

ACTION (BID) PROFILE

LEMON'S MARKET

- CARS CAN BE HIGH/LOW QUALITY $\vartheta_s \in \{h, \ell\}$, $\mathbb{P}(h) = q$

	u_{HIGH}	u_{LOW}
BUYER	6	4
SELLER	5	0

} VALUATION

- PRICE P IS ANNOUNCED
- SELLER / BUYER DECIDE WHETHER TO ACCEPT
- IF BOTH ACCEPT, A TRADE OCCURS
- PAYOFF (TRADE) → BUYER: VALUATION - PRICE; → SELLER: PRICE
- PAYOFF (NO TRADE) → BUYER: 0; → SELLER: VALUATION

LINEAR PUBLIC GOOD

$k \in (\frac{1}{n}, 1)$ RETURN

$$u_i(a) = k\sum_{j=1}^{n} a_j - a_i = \left(k\sum_{j \neq i} a_j\right) - (1-k)a_i = \binom{\text{OTHERS}}{\text{PAY}} - \binom{\text{YOU}}{\text{PAY}}$$

- DOMINATED ACTION TO GIVE NOTHING: u_i IS DECREASING IN a_i
- IMPOSING $a_i \geq m$ VALUE YOU CAN MAXIMISE TOTAL RETURN OF THE PLAYERS

$$\sum_{i=1}^{n} u_i(a) = k\sum_{j=1}^{n} a_j - \sum_{i=1}^{n} a_i = \sum_{i=1}^{n} a_i(nk-1)$$

IF $k > \frac{1}{n}$, THE UTILITY OF THE COMMUNITY INCREASES IN a_i

CROWDFUNDING

	I	D
I	$1, \vartheta_B$	$-\frac{1}{2}, 0$
P	$0, -\frac{1}{2}$	0,0

	L	R
U	1,1	0,0
M	1,1	2,1
D	0,0	2,1

	B	S
B	7,4	0,0
S	1,0	8,3
F	2,0	2,0

$a_A = F$ IS ALWAYS DOMINATED

SECOND-PRICE AUCTION

$v_i > 0$ VALUATION BY i, WRITE A BID $\Rightarrow$ SECOND-HIGHEST WINS AND PAYS

- WEAKLY DOMINATED ACTION TO BID $a^*_i = v_i$

$$u_i(v_i, a) = \begin{cases} v_i - \max_{j \neq i} a_j & a_i > \max_{j \neq i} a_j \ (\text{YOU WIN}) \\ \dfrac{v_i - \max_{j \neq i} a_j}{1 + |\arg\max_{j \neq i} a_j|} & a_i = \max_{j \neq i} a_j \ (\text{DRAW}) \\ 0 & a_i < \max_{j \neq i} a_j \ (\text{LOSE}) \end{cases}$$

(YOU WIN) → YOU DON'T WANT TO BID MORE THAN YOU ARE WILLING TO PAY
(DRAW) → YOU'D RATHER BID JUST MORE TO NOT DRAW
(LOSE) → YOU LOSE BECAUSE SOMEONE HAD A HIGHER VALUATION

YOU ARE CONSTRAINED BY v_i IN HOW MUCH YOU WILL BID.

$a_i = v_i$ GIVES AT LEAST THE UTILITY OF BIDDING $a_i > v_i$, AND SOMETIMES MORE

- $(a_i > v_i) \to$ YOU MAY WIN, AT THE COST OF PAYING TOO MUCH
- $(a_i = v_i) \to$ NO INCENTIVES
- $(a_i < v_i) \to$ YOU COULD HAVE WON BY BIDDING MORE

ROCK PAPER SCISSORS

	R	P	S
R	0,0	-1,1	1,-1
P	1,-1	0,0	-1,1
S	-1,1	1,-1	0,0

HARSANYI GAME

	I	D
I	$1, \vartheta_B$	$-c_A, 0$
P	$0, -c_B$	0,0

ACTION PROFILE
$\vartheta = (\vartheta_0, \vartheta_A, 1)$

$\vartheta_0, \vartheta_A, \vartheta_B = \{1, -\frac{C_B}{2}\}$

$\mathbb{P}(((\vartheta_0, \vartheta_B), 1)) = p$
$\mathbb{P}(((\vartheta_0, \vartheta_B), -\frac{C_B}{2})) = 1 - p$

- RATIONALISABLE → REMOVE DOMINATED ACTIONS
- NASH EQUILIBRIUM → INTERSECTION OF BEST REPLY FUNCTIONS
- MIXED NASH → MIXED ACTION ST. THE NASH EQ. BECOME INDIFFERENT

YOU LOOK FOR A CONJECTURE SO THE OTHER PLAYER BECOMES INDIFFERENT BETWEEN ACTIONS

PSET 1, 2

CH3

1)

	L	R
U	1,3	-2,0
M	-2,0	1,3
D	0,1	0,1

$\alpha_A = \frac{1}{2}U + \frac{1}{2}M$ } U, M ARE NOT DOMINATED

$u_A = \begin{cases} -\frac{1}{2} & \mu^A = L \\ -\frac{1}{2} & \mu^A = R \end{cases}$

α_A IS DOMINATED BY D

CH4

1) ρ IS MONOTONE:

$(A \subseteq B) \Rightarrow (\rho(A) \subseteq \rho(B))$

- TAKE $s \in \rho(A)$,
- s IS A BEST RESPONSE TO SOME $\mu^i \in \Delta(A)$
- $A \subseteq B$ SO $\mu^i \in \Delta(B)$
- $s \in \rho(B)$
- $\rho(A) \subseteq \rho(B)$

2) ND IS NOT MONOTONE

- $A \subseteq B \not\Rightarrow ND(A) \subseteq ND(B)$
- TAKE $A, ND(A)$
- IF $B = A \cup$ {ACTION STRICTLY PREFERRED TO ALL IN A}
- $ND(B) \not\subset A$, CONTAINING ONLY THIS ELEMENT

$x, y \in [0,4]$

3) $\pi(x,y) = 4(x+y+cxy)$ $|c \in (0, 1/4)$ (PROFIT OF COMPANY)

$\begin{cases} u_1 = x^2 \\ u_2 = y^2 \end{cases}$

i) $I = (I = \{x,y\}, A_1 = A_2 = [0,4], u_i(x,y) = \frac{\pi}{2} - i^2)$

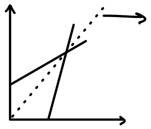
ii) BEST REPLY:

$u_1(x,y) = 2(x+y+cxy) - x^2$ |FIX y

$\frac{\partial u_1}{\partial x} = 2 + 2cy - 2x = 0 \rightarrow x^* = cy + 1$

WLOG $y^* = cx + 1$

$\frac{\partial^2 u}{\partial x^2} = -2 < 0$



$\longrightarrow y = c(cy+1)+1 = c^2y + c + 1$

iii) (x^*, y^*) IS RATIONALISABLE FOR ANY (x,y)

iv) $R = [0,4]^2$

$R \cap B(R) = [0, \min\{4, 4c+1\}]^2$ ($= a$)

$B^2(R) = [0, \min\{4, 4ca+1\}]^2$

PAYOFF IS JUST THE DOT BETWEEN P AND U

CORRELATED EQUILIBRIA MAKE SENSE TO FOLLOW BECAUSE YOU KNOW WHAT THE OTHER WILL DO AND EACH HAS AN INCENTIVE IN FOLLOWING THE PLAN

EXPECTED PAYOFF ENDS UP HIGHER

ASSUMING PERFECT INFORMATION TRANSMISSION

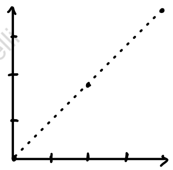
$P_B(E|P_A(E)) = P_B(E)$

CH5

EX 5

$\ell \in \{0, \dots m\}$ | m EVEN

VOTERS VOTE THE CLOSEST:



NASH EQ.

(0.5, 0.5)

(0, 1)

(1, 0)

EX 4

	b_1	b_2	b_3	b_4
a_1	1,5	4,2	3,3	2,6
a_2	1,6	6,2	3,1	1,2
a_3	2,3	3,4	4,5	4,3
a_4	1,2	2,6	2,4	3,1

CH5

EX2)

	B	P
B	1,5	4,4
P	0,0	5,1

PURE NE: $(B,B), (P,P)$

MIXED NE: FIND $\alpha_A = \alpha_A(B)\delta_B + \alpha_A(P)\delta_P$ ($\alpha_A(P) = 1-\alpha_A(P)$)

ST. $U_B(\alpha_A, B) = U_B(\alpha_A, P)$

$\alpha_A(B)u_B(B,B) + (1-\alpha_A(B))u_B(P,B) = \alpha_A(B)u_B(B,P) + (1-\alpha_A(B))u_B(P,P)$

$a \cdot 5 + (1-a) \cdot 0 = a \cdot 4 + (1-a)1$

$5a = 4a + 1 - a$

$2a = 1 \longrightarrow a = 1/2$

$\boxed{u_B = \frac{5}{2}}$

FIND $\alpha_B = \alpha(B)\delta_B + (1-\alpha(B))\delta_P$ ST.

$u_A(B, \alpha_B) = u_A(P, \alpha_B)$

$\alpha_B(B)u_A(B,B) + (1-\alpha_B(B))u_A(B,P) = \alpha_B(B)u_A(P,B) + (1-\alpha_B(B))u_A(P,P)$

$a \cdot 1 + (1-a)4 = a \cdot 0 + (1-a)5$

$a = 1-a \rightarrow a = 1/2$

$\boxed{u_A = \frac{5}{2}}$

EX 4

- RATIONALISABLE $\longrightarrow \{M, D\} \times \{L, R\}$
- REMOVE DOMINATED ACTIONS

	L	M	R
T	6,8	2,6	8,2
M	8,2	4,4	9,5
D	8,10	4,6	6,7

PURE NASH

$\{(D,L), (M,R)\}$

	L	M	R
T	6,8	2,6	8,2
M	8,2	4,4	9,5
D	8,10	4,6	6,7

CH 8

EX 1

$I = \{1,2\}$, $\Omega = \{1..9\}$, $P(\omega) = \frac{1}{9}$ $\forall \omega \in \Omega$

$\mathcal{J}_1 = \{\{1,2,3\}, \{4,5,6\}, \{7,8,9\}\}$

$\mathcal{J}_2 = \{\{1,2,3,4\}, \{5,6,7,8\}, \{9\}\}$

TO A PLAYER, ALL WORLDS IN THE SAME SET OF THE PARTITION ARE INDISTINGUISHABLE

i) $P_1(A|\mathcal{J}_1(\omega=9)) = \frac{P_1(A \cap \{7,8,9\})}{P_1(\{7,8,9\})} = \frac{1/9}{1/3} = \frac{3}{9} = \frac{1}{3}$

$A = \{1,5,9\}$

ii) $P_2(A|\mathcal{J}_2(\omega=9)) = 1$

iii) 1 ANNOUNCES $P_1(A|\mathcal{J}_1(\omega=9))$,

HOW DOES $P_2(A|\mathcal{J}_2(\omega=9))$ CHANGE?

2 ALREADY KNOWS WITH P=1 THE WORLD STATE.

iv) 2 ANNOUNCES $P_2(A|\mathcal{J}_2(\omega=9))$ TO ONE, SO $P_1(\dots) = 1$

v) PROBABILITIES CONVERGE TO 1 IN ONE UPDATE.

vi) IF $\omega = 8$, $\mathcal{J}_1(8) = \{7,8,9\}$ $\rightarrow$ $P_1(A|\mathcal{J}_1(8)) = \frac{1/9}{1/3} = 1/3$

$A = \{1,5,9\}$ $\mathcal{J}_2(8) = \{5,6,7,8\}$ $P_2(A|\mathcal{J}_2(8)) = \frac{1/9}{4/9} = \frac{1}{4}$

- PLAYER 1 ANNOUNCES 1/3, AS THEY WOULD ALWAYS SO 2 DOES NOT CHANGE
- PLAYER 2 ANNOUNCES 1/4, MAKING 1 RULE OUT {9} SO 1 KNOWS ω^* (TRUE) $\in \{7,8\}$ (IF ω^* WAS 6 OR 8, ANNOUNCEMENT WOULD HAVE BEEN 1/3)

A PLAYER, AFTER BEING TOLD ω, ONLY KNOWS $\mathcal{J}_i(\omega)$, NOT THE TRUE STATE OF THE WORLD

ALL PLAYERS KNOW $\mathcal{J}(\omega)$ BUT THEY DON'T KNOW WHAT THE TRUE VALUE ω IS, THOUGH THEY CAN TRY TO NARROW IT DOWN

$(\omega = 6)$

$\mathcal{J}_1(6) = \{4,5,6\} \longrightarrow P_1(A|\mathcal{J}_1(6)) = \frac{1/9}{1/3} = \frac{1}{3}$

$\mathcal{J}_2(6) = \{5,6,7,8\} \rightarrow P_2(A|\mathcal{J}_2(6)) = \frac{1/9}{4/9} = \frac{1}{4}$

1 ANNOUNCES $\frac{1}{3} \longrightarrow$ NOTHING NEW FOR 2

2 ANNOUNCES $\frac{1}{4} \rightarrow$ 1 KNOWS ω IS NOT $\{9\}$: OTHERWISE 2 WOULD HAVE SAID 1/4

BOTH THINK $\omega \in \{1,5\}$ IF $\mathcal{J}_1$ WAS IN $\{7,8,9\}$, THE

1 ANNOUNCES $\frac{1}{3}$ AGAIN $\rightarrow$ PLAYER WOULD HAVE SAID $\frac{1}{2}$

2 (EXCLUDING 7,8) ANNOUNCES 5,6

$\mathcal{J}_1 = \{\{1,2,3\}, \{4,5,6\}, \{7,8,9\}\}$

$\mathcal{J}_2 = \{\{1,2,3,4\}, \{5,6,7,8\}, \{9\}\}$

$A = \{1,5,9\}$ $(\omega = 4)$

$1 \rightarrow \omega \in \{4,5,6\}$: $P_1(A|\mathcal{J}_1) = \frac{1}{3}$

$2 \rightarrow \omega \in \{1,2,3,4\}$: $\quad " = \frac{1}{4}$

$1 \rightarrow \omega \notin \{9\} \longrightarrow P_1 = \frac{1}{3}$

2 NOTHING NEW

$1 \rightarrow \omega \in \{4,5,6\}$: $P_1 = \frac{1}{3}$

$2 \rightarrow \omega \in \{1,2,3,4\}$: $\quad " = \frac{1}{4}$

1 NOTHING NEW

2: SINCE 1 DID NOT CHANGE, $\mathcal{J}_1$ CANNOT BE $\{7,8,9\}$

$1 \longrightarrow \frac{1}{4}$

$2 \rightarrow \frac{1}{4}$

SINCE 1

CH6

SET OF PAYOFF PROFILES FROM CORRELATED EQUILIBRIA IS CONVEX AND COMPACT

ACTIONS PLAYED WITH P>0 IN CORR. EQUILIBRIA ARE RATIONALISABLE

EX 4

	B	S
B	2,1 (α)	0,0 (β)
S	0,0 (γ)	1,2 (δ)

i) SET OF FEASIBLE PAYOFFS:

CONVEX HULL OF THE PURE GAMES PAYOFFS

$\left\{\binom{u_A}{u_B}\right\} = \left\{\alpha\binom{2}{1} + \beta\binom{0}{0} + \gamma\binom{0}{0} + \delta\binom{1}{2} \middle| \begin{matrix} \alpha+\beta+\gamma+\delta = 1 \\ \alpha, \beta, \gamma, \delta \geq 0 \end{matrix}\right\}$

ii) NASH PAYOFFS $\rightarrow$ {FROM PURE} $\cup$ {FROM MIXED}

- PURE: $\binom{2}{1}, \binom{1}{2}$
- MIXED: 1. FIND MIXED NE AS

$u_A(B, \mu^A) = u_A(S, \mu^A)$

$a u_A(B,B) + (1-a)u_A(B,S) = a u_A(S,B) + (1-a)u_A(S,S)$

$a \cdot 2 = (1-a)1$

$a = \frac{1}{3} = \alpha_B(B) \longrightarrow \begin{cases} \alpha_B(B) = \frac{1}{3} \\ \alpha_B(P) = \frac{2}{3} \end{cases}$ WLOG $\begin{cases} \alpha_A(P) = \frac{1}{3} \\ \alpha_A(B) = \frac{2}{3} \end{cases}$

2. FIND $\binom{u_A}{u_B} = \binom{2/3}{2/3}$

EX 5

	L	R
U	8,8	4,9
D	9,4	1,1

PURE NASH EQUILIBRIA:

$\{(D,L), (U,R)\}$

PAYOFFS $= \{(9,4), (4,9), (7,7)\} \longrightarrow co\{\dots\}$

MIXED NASH EQ:

$u_A(U, \mu^A) = u_A(D, \mu^A)$

$a u_A(U,L) + (1-a)u_A(U,R) = a u_A(D,L) + (1-a)u_A(D,R)$

$a8 + (1-a)4 = a9 + (1-a)1$

$(8-4)a + 4 = 8a + 1$

$-4a + 3 = 0 \rightarrow a = 3/4$ $\begin{cases} \alpha_A(L) = \frac{3}{4} \\ \alpha_A(R) = \frac{1}{4} \end{cases}$

$8\alpha + 4\beta \geq 9\alpha + 1\beta$

$9\gamma + 1\delta \geq 8\gamma + 4\delta$

$8\alpha + 4\gamma \geq 9\alpha + 1\gamma$

$9\beta + 1\delta \geq 8\beta + 4\delta$

...

$u_B(\mu^B, L) = u_B(\mu^B, U)$

$b u_B(U,L) + (1-b)u_B(D,L) = b u_B(U,R) + (1-b)u_B(D,R)$

$b8 + (1-b)4 = b \cdot 9 + (1-b)1$

$4b + 4 = 8b + 1$

$b = 3/4$ $\begin{cases} \alpha_B(U) = 3/4 \\ \alpha_B(R) = 1/4 \end{cases}$

iii) CORRELATED EQUILIBRIUM PAYOFFS:

4X EQUATIONS ALWAYS IN TWO VARIABLES

$2\alpha + 0\beta \geq 0\alpha + 1\alpha \longrightarrow 2\alpha \geq \alpha \rightarrow \alpha \geq 0$

$0\gamma + 1\delta \geq 2\gamma + 0\beta \longrightarrow \delta \geq 2\gamma$

$1\alpha + 0\gamma \geq 0\alpha + 2\gamma \longrightarrow \alpha \geq 2\gamma$

$0\beta + 2\delta \geq 1\beta + 0\delta \longrightarrow \delta \geq \frac{\beta}{2}$

$\alpha + \beta + \gamma + \delta \geq 0$

$\alpha, \beta, \gamma, \delta \geq 0$

$\boxed{\begin{matrix} \delta \geq 2\gamma & \\ \alpha \geq 2\gamma & \alpha+\beta+\gamma+\delta \geq 0 \\ \delta \geq \frac{\beta}{2} & \alpha, \beta, \gamma, \delta \geq 0 \end{matrix}}$

SOLUTION IS THE SET OF CORRELATED EQUILIBRIA

COMPUTE FOR EACH POINT IN THIS SET, ITS E(PAYOFF)

$\mathcal{J}_1 = \{\{1,2,3\}, \{4,5,6\}, \{7,8,9\}\}$

$\mathcal{J}_2 = \{\{1,2,3,4\}, \{5,6,7,8\}, \{9\}\}$

$A = \{1,5,9\}$

(STILL CH8)

EX 3

$\Theta_1 = \{\vartheta_1^1, \vartheta_1^2\}$

$\Theta_2 = \{\vartheta_2\}$

$\begin{cases} P(\vartheta_1^1, \vartheta_2) = \frac{1}{3} \\ P(\vartheta_1, \vartheta_2) = \frac{2}{3} \end{cases}$

FIND A BAYESIAN EQUILIBRIUM:

$(\vartheta_1^1, \vartheta_2)$

A \ B	L	R
U	2,0	0,3
D	0,4	1,0

$(\vartheta_1^2, \vartheta_2)$

	L	R
U	0,3	3,1
D	2,0	0,1

ANN ACTS DIFFERENTLY BASED ON HER TYPE

- BOB MUST BE INDIFF. BETWEEN HIS ACTIONS:

$u_B(\alpha_A, L) = u_B(\alpha_A, R)$

$A \begin{cases} y = P(a_A(\vartheta_1^1) = U) \\ z = P(a_A(\vartheta_1^2) = U) \end{cases}$

$B \begin{cases} x = P(a_B = L) \end{cases}$

$$\frac{1}{3} u_B^{\vartheta_1^1}(\alpha_A, L) + \frac{2}{3} u_B^{\vartheta_1^2}(\alpha_A, L) = \frac{1}{3} u_B^{\vartheta_1^1}(\alpha_A, R) + \frac{2}{3} u_B^{\vartheta_1^1}(\alpha_A, R)$$

$$\frac{1}{3}\left[y\,u_B(U,L) + (1-y)u_B(D,L)\right] + \frac{2}{3}\left[z\,u_B(U,L) + (1-z)u_B(D,L)\right] = \text{ooo}$$

$\text{ooo} = \text{ooo}$

$y = \frac{2+6z}{7}$ } IMPOSITION SO BOB IS INDIFFERENT