11. 25. 土. ~~[illegible]~~ 수학 마지

#6.1.1(1)

		C		
		0	1	2
R	0	(0,0)	(100,-100)	(-100,100)
	1	(100,-100)	(-100,100)	(100,-100)
	2	(100,100)	(100,-100)	(-100,100)

홀. R.
짝. C.

#6.1.1(2)

		C		
		0	1	2
R	0	(0,0)	(100,-100)	(-200,200)
	1	(100,-100)	(-200,200)	(300,-300)
	2	(-200,200)	(300,-300)	(-400,400)

홀. R. ×수

#6.1.1(3)

	0	1	2
0	0	100	-100
1	100	-100	100
2	-100	100	-100

	0	1	2
0	0	100	-200
1	100	-200	300
2	-200	300	-400

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#6.2.1(1)

(R_1, R_2) ~~R_3~~

(C_1, C_2)

R의 전략 1이 열등전략이다.

#6.2.1(2)

R의 전략 3이 열등전략이다.
∧
C의 전략 Ⅲ이 열등전략이다.

#6.2.2(1)

$\alpha = \max\min A$
$= \max(-2, -1, 1)$
$= 1$

$\alpha = A_{31} = 1.$

$\beta = \min\max A$
$= \min(1, 3, 3)$
$= 1$

$\beta = A_{31} = 1.$

$\alpha = \beta = A_{31}$ 이므로 결정적이다

안장점은 (3,1). 게임값은 1.

#6 2.7 (2)

$\alpha = \max\min A$
$= \max(-1, 0, -1, -1)$
$= -1$.

$\alpha = a_{13}$ or a_{24} or a_{31} or $a_{32} = -1$.

$\beta = \min\max A$
$= \min(3, 1, 1, 4)$
$= 1$.

$\beta = a_{12}$ or $a_{23} = 1$.

$\alpha \neq \beta$ 이므로 결정적이지 않다.

그러므로 게임값이 존재하지 않는다.

#6.3.1.(1)

R: $\text{Maxmin } A$

$= \text{Max}(1, 1)$

$= 1 = a_{11}$ or a_{22}.

C: $\text{minMax } A$

$= \min(2, 2)$

$= 2 = a_{12}$ or a_{22}.

결정적이지 않으므로 게임값은 존재하지 않고
최적혼합전략은 존재한다.

$\mathbb{P} = (p, 1-p)$

$\mathbb{q} = (q, 1-q)$ 라 하자.

R: $\text{Maxmin } E(\mathbb{p}, e_i)$.

$= \text{Maxmin } (p, 1-p)\begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix} e_i^T$.

i) $i=1$.

$(p, 1-p)\begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}\begin{pmatrix} 1 \\ 0 \end{pmatrix}$.

$= (p \;\; 1-p) \cdot \begin{pmatrix} 1 \\ 2 \end{pmatrix}$

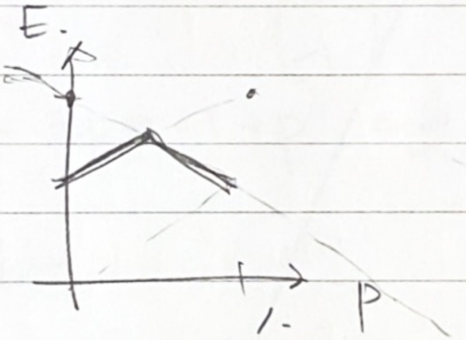
$= p+2-2p = \underline{2-p}$.

ii) $q=2$

$(p,\ 1-p)\begin{pmatrix}1 & 2\\ 2 & 1\end{pmatrix}\begin{pmatrix}0\\1\end{pmatrix}$

$= (p,\ 1-p)\cdot\begin{pmatrix}2\\1\end{pmatrix}$

$= 2p+1-p = \underline{p+1}$.



$2-p = p+1$.

$1 = 2p$. $\quad p=\frac{1}{2} \quad \underline{p=(\frac{1}{2},\frac{1}{2})}$

$E(p\ q_1) = (\frac{1}{2}, \frac{1}{2})\begin{pmatrix}1 & 2\\ 2 & 1\end{pmatrix}\begin{matrix}1\\0\end{matrix}$

$= (\frac{1}{2}, \frac{1}{2})\begin{pmatrix}1\\2\end{pmatrix} = \frac{3}{2}. \quad \underline{E=\frac{3}{2}}$.

C: $\min\mathrm{Max}\ \cancel{e_j}\ E(e_j, q_1)$.

$= \min\mathrm{Max}\ e_j\begin{pmatrix}1 & 2\\ 2 & 1\end{pmatrix}\begin{pmatrix}q\\1-q\end{pmatrix}$

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i). $j=1$.

$(1,\ 0)\begin{pmatrix}1 & 2\\ 2 & 1\end{pmatrix}\begin{pmatrix}q\\ 1-q\end{pmatrix}$ $\qquad (1\times \cancel{2})\times(\cancel{2}\times 2)$
$\qquad\qquad = (1\times 2)$.

$= (1+0,\ 2+0)\begin{pmatrix}q\\ 1-q\end{pmatrix}$

$= (q+2-2q) = (-q+2)$.

$-q+2=\frac{3}{2}$.
$q=\frac{1}{2}$. $\qquad q=\left(\frac{1}{2}, \frac{1}{2}\right)$

#6.3.1.(2)

R: $\text{Maxmin}\,A = \text{Max}(-1,-1)$
$= -1 = a_{12}$ or a_{21}

C: $\text{min Max}\,A = \min(3, 4, 2)$
$= 2 = a_{13}$.

$-1 \neq 2$ 이므로 게임값은 존재하지 않고
최적혼합 전략이 존재한다.

$p = (p,\ 1-p)$.
$q = (\cancel{a},\ \cancel{b},\ 1-\cancel{a}-\cancel{b})$라 하자

$\mathbb{P} = (p, 1-p)$

$q = (a, b, 1-a-b)$ 라 하자.

$P_i = p \cdot A \cdot e_i^T$

i) $i=1$

$$(p, 1-p)\begin{pmatrix}3 & -1 & 2\\ -1 & 4 & 1\end{pmatrix}\begin{pmatrix}1\\0\\0\end{pmatrix}$$

$$= (p, 1-p)\begin{pmatrix}3\\-1\end{pmatrix}$$

$$= 3p - 1 + p = 4p-1$$

ii) $i=2$

$$(p, 1-p)\begin{pmatrix}-1\\4\end{pmatrix}$$

$$= -p + 4 - 4p = -5p+4$$

iii) $i=3$

$$(p, 1-p)\begin{pmatrix}2\\1\end{pmatrix}$$

$$= 2p + 1 - p = p+1$$

$4p-1 = -5p+9.$

$9p = 5.$ $p = \frac{5}{9}.$ $\left(\frac{5}{9}, \frac{11}{9}\right)$ $p = \left(\frac{5}{9}, \frac{4}{9}\right)$

$\frac{20}{9} - 1 \times \frac{9}{9} = \frac{11}{9}$

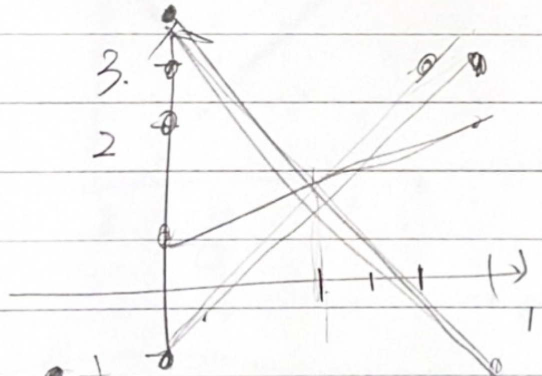
$4p-1 = p+1.$

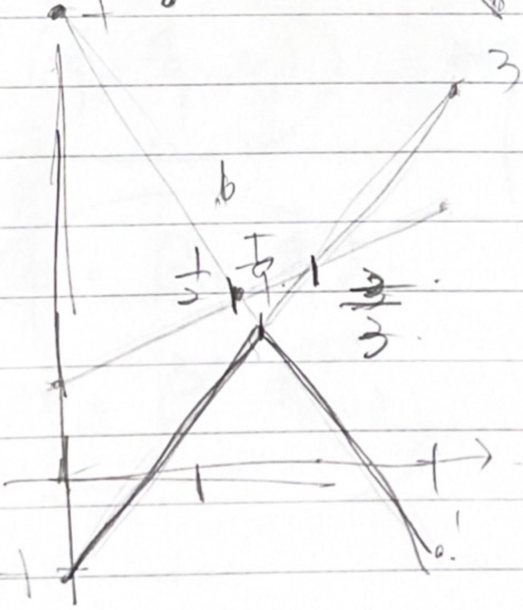
$3p = 2.$ $p = \frac{2}{3}.$ $\left(\frac{2}{3}, \frac{5}{3}\right)$

$-5p+4 = p+1$

$-6p = -3.$ $p = \frac{1}{2}.$ $\left(\frac{1}{2}, \frac{3}{2}\right)$

$-\frac{5}{2} + \frac{8}{2} = \frac{3}{2}$





$p = \left(\frac{5}{9}, \frac{4}{9}\right)$

$E = pAq^T = \frac{11}{9}$

$$\left(\cancel{\tfrac{5}{9}}\ \cancel{\tfrac{4}{9}}\right)\begin{pmatrix} 3 & -1 & 2 \\ -1 & 4 & 1 \end{pmatrix}\begin{pmatrix} a \\ b \\ 1-a-b \end{pmatrix} = \frac{11}{\cancel{9}}$$

$$\left(\underset{11}{\cancel{15-4}},\ \underset{11}{\cancel{-5+16}},\ \underset{14}{\cancel{10+4}}\right)\begin{pmatrix} a \\ b \\ 1-a-b \end{pmatrix} = 11$$

$11a + 11b + \cancel{14} - 14a - 14b = \cancel{11} - 3$

$-3a - 3b = -3$. $\quad \underline{a+b=1}$

$q = (q, 1-q, 0)$ 이라 하자.

$c : \min \mathrm{Max}\, E(e_j, q)$

I) $j=1$

$$(1, 0)\begin{pmatrix} 3 & -1 & 2 \\ -1 & 4 & 1 \end{pmatrix}\begin{pmatrix} q \\ 1-q \\ 0 \end{pmatrix}$$

$$= (3, -1, 2)\begin{pmatrix} q \\ 1-q \\ 0 \end{pmatrix}$$

$= 3q - 1 + q = 4q - 1$

II) $j=2$

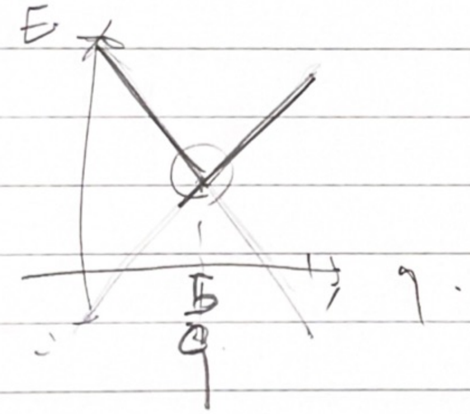
$$(0, 1)\begin{pmatrix} 3 & -1 & 2 \\ -1 & 4 & 1 \end{pmatrix}\begin{pmatrix} q \\ 1-q \\ 0 \end{pmatrix}$$

$$= (-1, 4, 1)\begin{pmatrix} q \\ 1-q \\ 0 \end{pmatrix}$$

$$= -q+4-4q = \underline{-5q+4}$$

$$4q-1 = -5q+4$$

$$9q = 5 \quad q = \frac{5}{9}$$



$$q = \left(\frac{5}{9}, \frac{4}{9}, 0\right) \qquad \frac{20}{9} - \frac{1}{9} = 11$$

즉 $p = \left(\frac{5}{9}, \frac{4}{9}\right)$

$q = \left(\frac{5}{9}, \frac{4}{9}, 0\right)$