12-1-05

	R (300)	P (P_2)	S (300)
P_1 R	0 (100 times)	-100	100
P	100 (100 times)	0	-100
S	100 (100 times)	100	0

What would happen if we played 900 games with random, uniform strategy?

P_1 doesn't win anything overall.

Repeat P_2 plays R, S only in 900 times

	R (450)	P (P_2)	S (450)
P_1 450 R	225 0	–	225
450 P	225	–	-225
S	–	–	–

	R (450)	P	S (450)
300 R	0		150
300 P	150		-150
300 S	-150		0

P2

		a	b	min
P1	c	-2	0	-2
	d	-1	-4	-4
	max	-1	0	

maximin = max of row mins ⊙ -2
minimax = min of col maxs -1

No saddle -

P2

		w	x	
P1	y	-2*	0	-2*
	z	-3	-4	-4
		-2*	0	

maximin = -2 }
minimax = -2 } saddle point.

Play 200 times

		P_2: a	P_2: b
P_1	c	-100	0
	d	-50	-200
		-150	-200

For best strategy - P_2 wants to randomly choose a, b so that the overall pay ~~off~~ is the same for P_1 playing ~~a, b~~ c, d

probability $= p = \frac{x}{200}$ $\qquad \frac{200-x}{200} = 1 - \frac{x}{200} = 1 - p$

		P_2: a (x)	P_2: b (200 - x)	
P_1	c	$-2\cdot\left(\frac{x}{2}\right) = -x$	$0\cdot\left(\frac{200-x}{2}\right) = 0$	$-x$
	d	$-1\left(\frac{x}{2}\right)$ ~~$= -\frac{x}{2}$~~	$-4\left(\frac{200-x}{2}\right) =$ ~~$-400+2x$~~	$-\frac{x}{2} - 400 + 2x$

~~Total payoff $-\frac{3}{2}x = -400 + 2x$ Solve for x~~

~~$+400 + \frac{3}{2}x \quad +400 + \frac{3}{2}x$~~

~~$400 = \frac{7}{2}x$~~

~~$114 = \frac{800}{7} = x$~~ $\qquad$ ~~$\frac{x}{200} = \frac{114}{200} = 57\%$~~

$$-x = \frac{3}{2}x - 400$$
$$+400 + x \quad +\frac{3}{2}x \quad +400$$

$\rightarrow 400 = \frac{5}{2}x \qquad x = \frac{2}{5}(400) = 160$

		P_2: a	b
P_1	c (p)	$-2p$	$0p$
	d ($1-p$)	$-(1-p)$	$-4(1-p)$
		$-2p - 1 + p$	$-4 + 4p$

Total Payoffs

$-2p$

$-5(1-p)$

Solve $-2p = -5(1-p)$

$-2p = -5 + 5p$

$+5 \quad +2p \qquad +5 \quad +2p$

$5 = 7p$, $p = \frac{5}{7} = .714$

See page (5)

So P_1 should choose c 71.4 % of the time & choose d 29.6 % of the time.

So we can get solutions even if there are no saddle points

p 271

		Colin: X	Z	
rose	A	-2	8	-2
	C	0	4	0
		0	8	

maximin = 0

minimax = 0

Squid Boy

Sponge bob

	X	Z
A	-2	-3
C	-2	-8

Wilma

Fred

		X	Z
p	A	4	-3
1-p	C	0	6

No Saddle

From Page 4

$$-2p - 1 + p = -4 + 4p$$

$$+2p \quad +4 \quad -p \qquad +4 \quad +2p - p$$

$$3 = 5p$$

$\frac{3}{5}$ = 60% = p = % of time P_1 should choose "C"

Paris

	X	Z	min
Nicole A	-2	-3	-3
B	(1)	2	1
max	1	2	

maximin = 1

minimax = 1

Jessica

	X p	Z 1-p	min
Nick A	-2 -2p	-3 -3(1-p)	-3
C	-4 -4p	2 2(1-p)	-4
max	-2	2	

maximin -3

≠

minimax = -2

Keep Nick from having an advantage

Add rows

$$\underbrace{-2p + -3 + 3p}_{A} = \underbrace{-4p + 2 - 2p}_{C}$$

$$+2p \quad +3 \quad +4p \qquad +4p \quad +3 \quad +2p$$

$$7p = 5, \quad p = 5/7$$

Nick's Payoff: $p - 3 = 5/7 - 3 = \frac{-16}{7}$