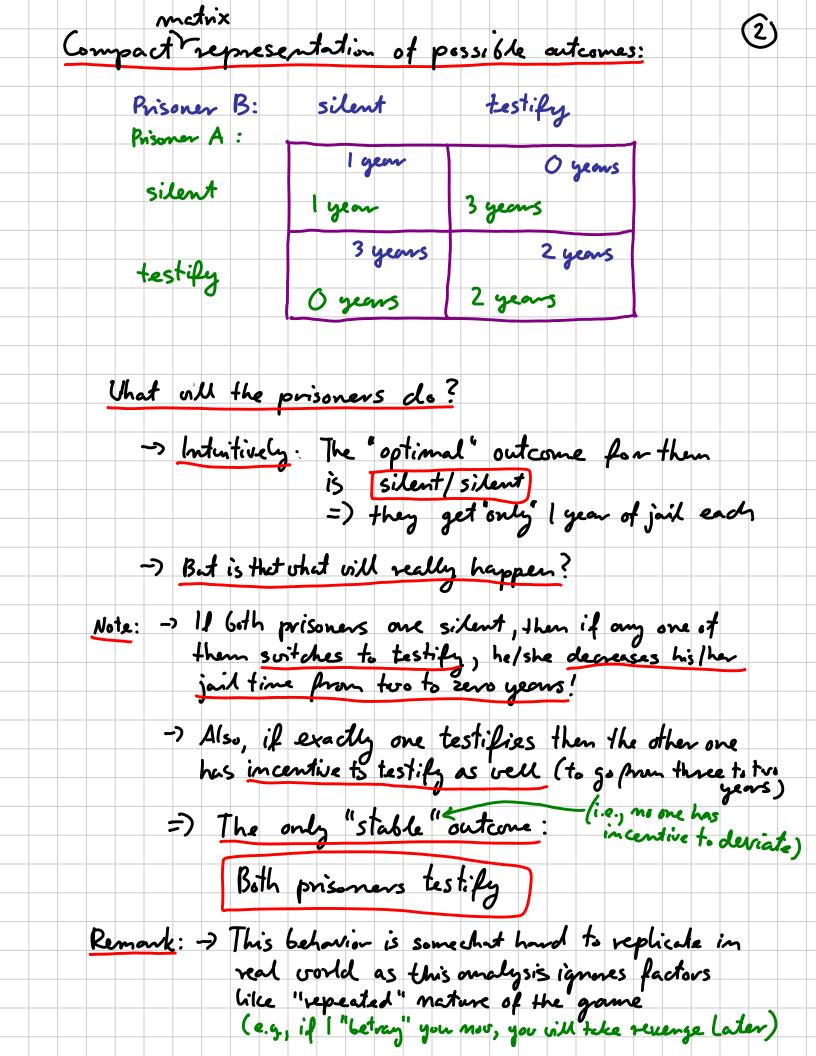
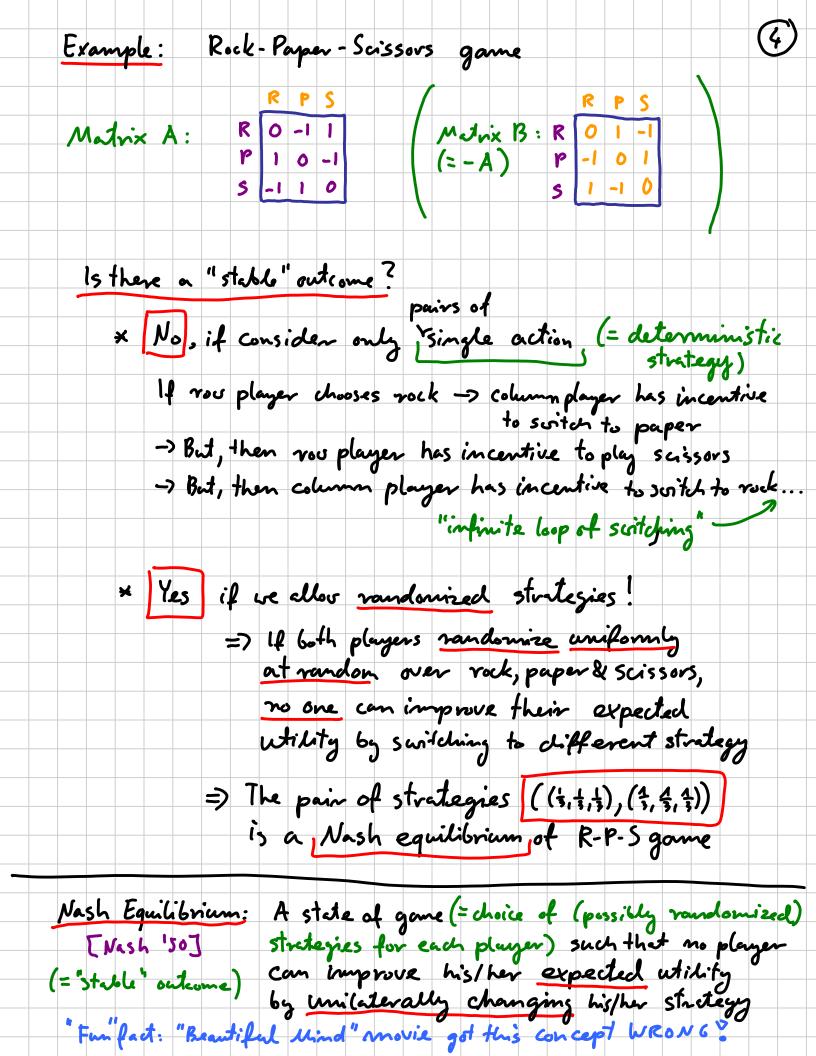
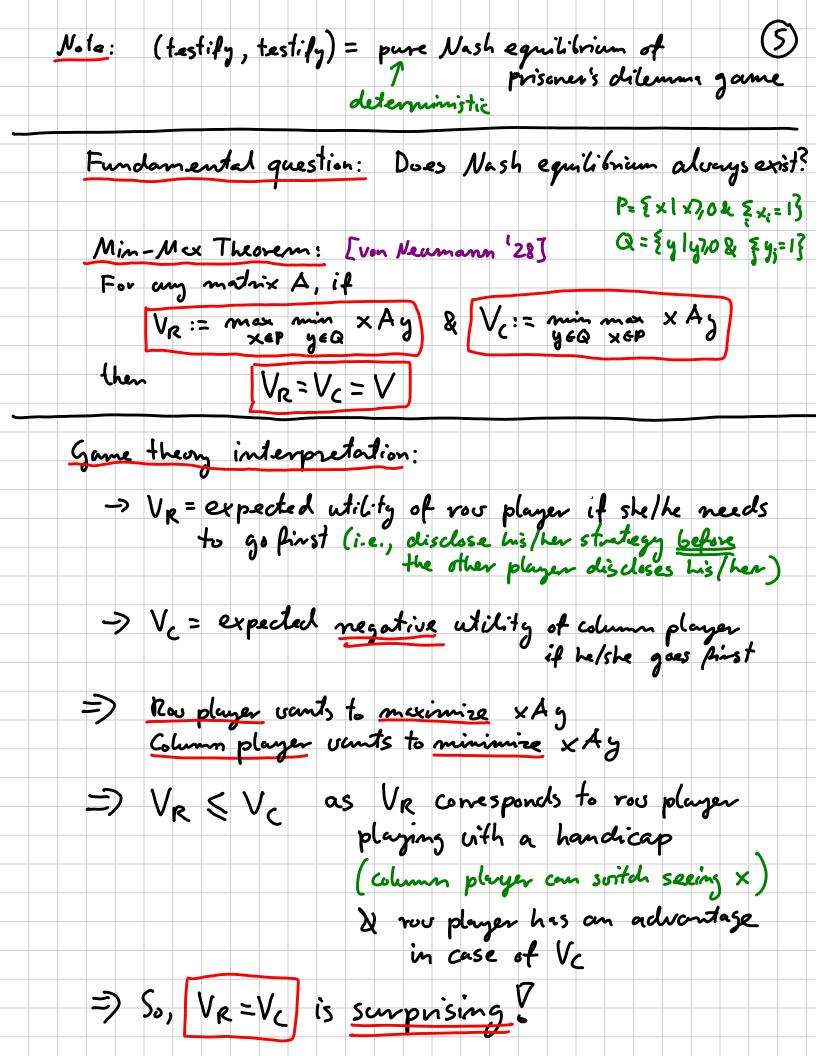
6.0	46	Lecture 10	3/16
Adm	in;		0
		lay	
-> t	PSet 5 is out tod Je vill have a p	sost-quiz survey	
Today			
->	Game theory		
	Two person zero-sa		
——————————————————————————————————————	Min-Max theorem How to get rich? (S	itale market prediction)	
	(Rand.) Veighted m		
1 4			
Let 5	play a game!		
Prison	n's Dillemma		
		and of considered grown and a	nested
Setting	They are	put in <u>separate</u> Cells	
		no means to communicate	7
		not have evidence to convid	
	of them	on the principal change one able to sentence them on	
	But: Hhey	our able to sentence them on	a lesser change
	-> They offer	er each one of them:	
	14	you testify against the other,	gon valk
	<u> </u>	ee, and him vill go to jail	for three years"
	-> Catch: 1	If both testify, they both go	e to prison
		but 'only for two years	,

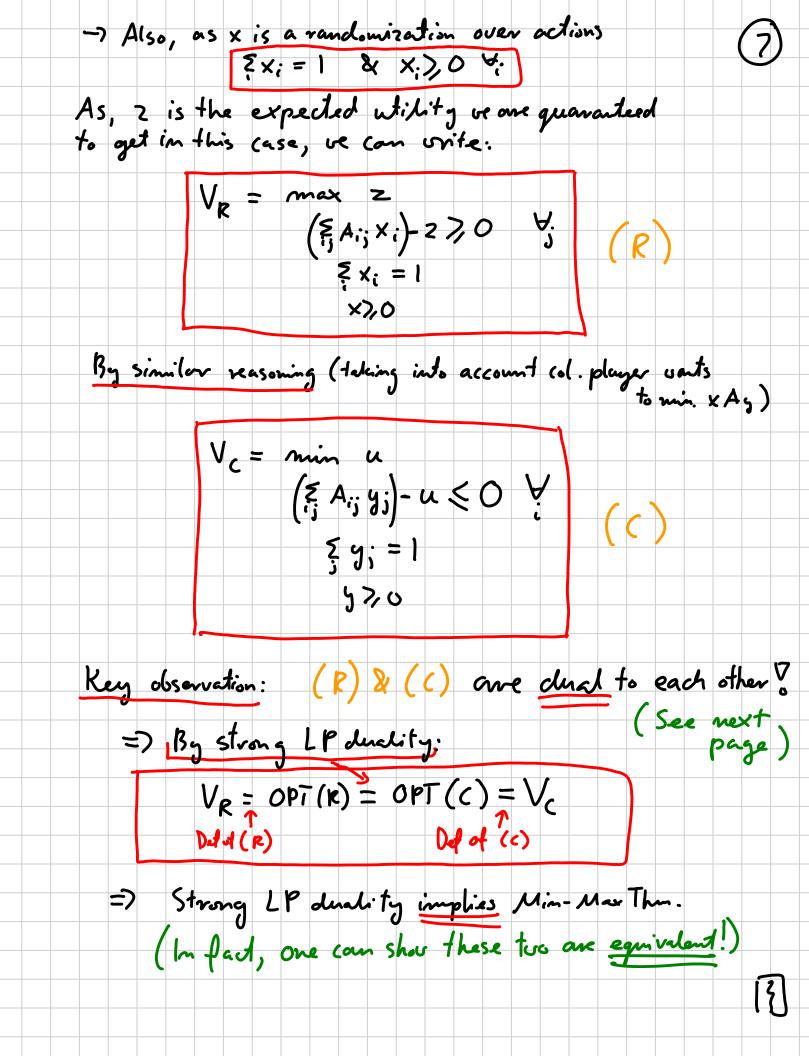


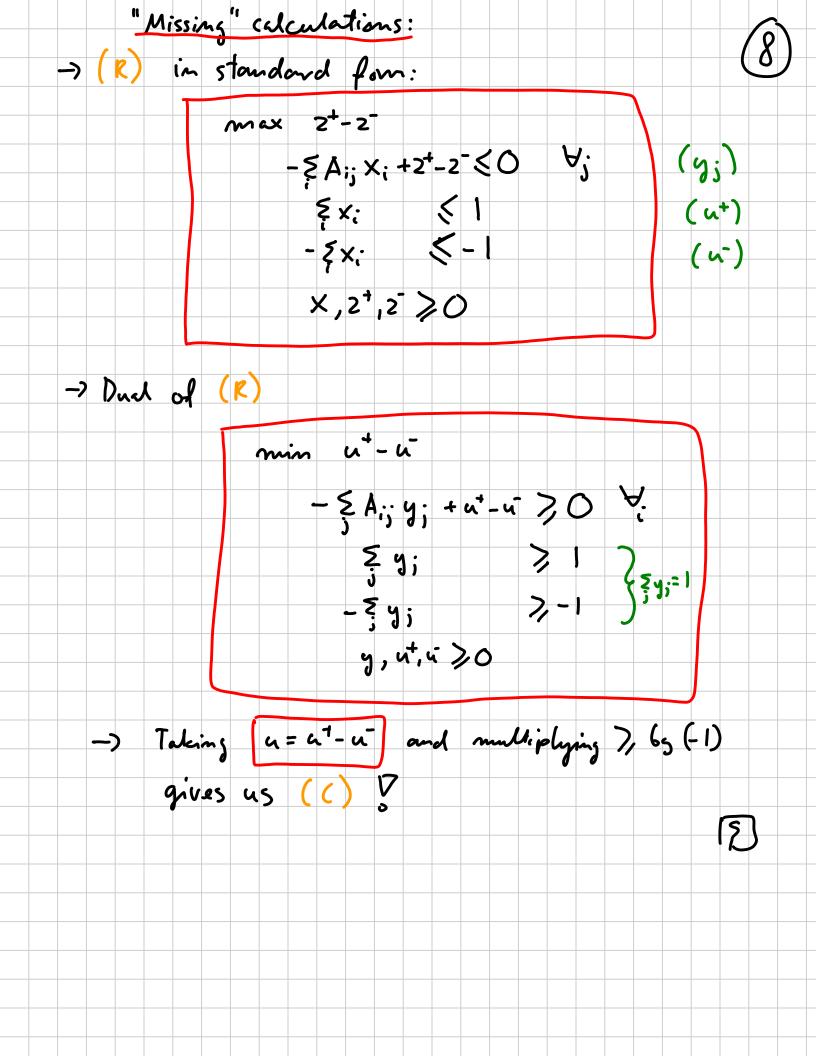
Cames (	from game	theory perspe	clise):	3)
predict	rational be	to help us led havior in situe	tions of conf	hick
	7		1	
	m to maximu utility (= ga	nze Eve	ny player's	actions affect
(Altruism, one NOT	masochism, modelled)	etc. (m.	ot necessaril	actions affect es' utility of in negative vary)
Convenie	A vay to.	represent two	s-player ge	me:
Utility	matrices:	A = wtility >	matrix of Plan	ingen A B
				(= Row player) (= Column player)
				Player B (cdumn):
		utility of Pla		
	B;; = -		— B on ou	tcome (i,j)
		games: (Tuo-		-sam games
Tu		mes in which		Note: Fully
		$A_{ij} = -B_{ij}$	ç,;j	described by matrix A (or B)
=> /	Models dire	et conflict		alone
	(= "your los	ss is my g	ain")	

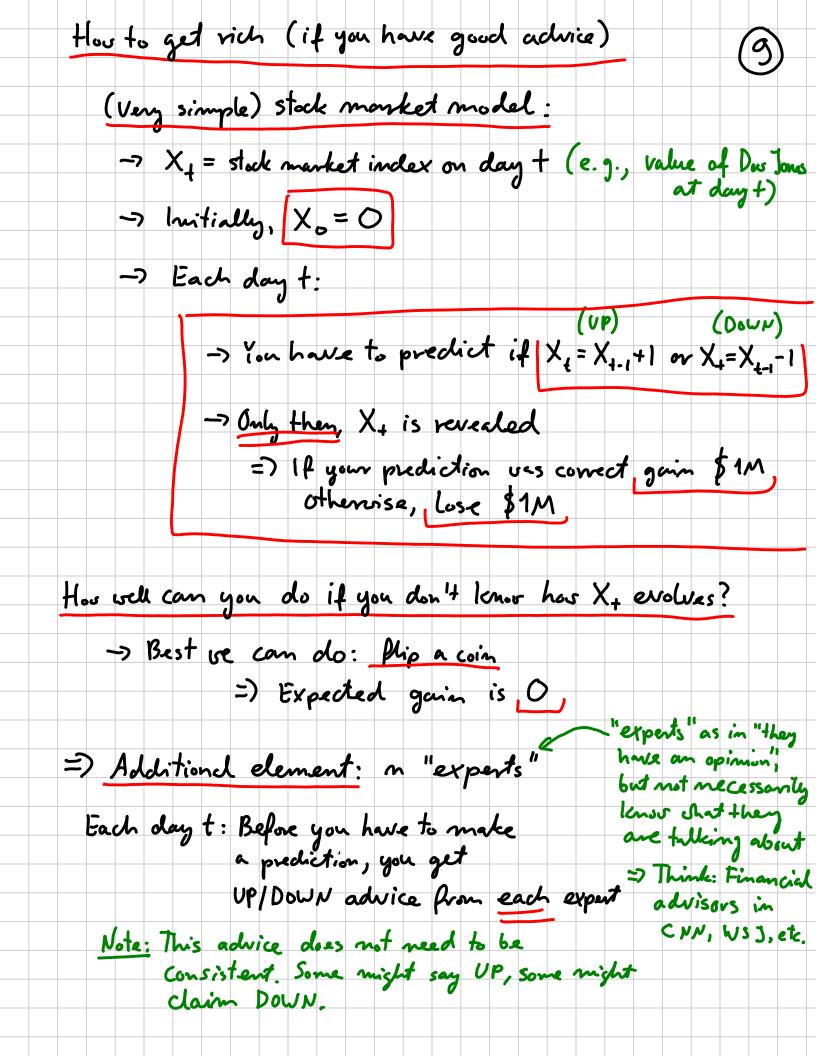




(G) x = argmex min x A g Key implication: y := organin max xAy => (x',y') is always a Nash equilibrium of the two person zero-sum game described by A (If there was an incentive to deviate from x" or y" it would contradict that VR=Vc) => Nash equilibrium always exists for too-person zero-sun garos How about general games? [ Nash '51]: Any game with a finite number of players
and <u>Pinite</u> number of possible actions per player
has a Nash equilibrium Proof of Min-Max Theorem: Key idea: Let's express VR (&Vc) as an LPP Recall: VR = mex min x A y =) if z = VR and x is the strategy corresponding to VR, we have to have that, for any column action j, the expected writing ve get if column player plays j has to be ? 2 (otherwise col. player could switch to playing jound thus contradict that z=VR) =) In other words: \{ \int A; \times z \} \}







Roblem: This advice might be wrong or even	(10)
Roblem: This advice might be crong or even	
Good: Do well it at lost one arroad is consisted	the
God: Do well if at least one expert is consister praviding decent advice	2
Measure of quality:	
	. 4 1
Regret = (# of our mis predictions) - (# of m	Laters f
-> Think: How much better off would we be, if or	followed
advice of the best expert from the	stant
Kan dilla 14 a 15 a 15 a 16 a 16 a 16 a 16 a 16 a 16	
Key difficulty: We know tho the best expert is only in hindsight! (and then it is to	(-1-)
Hos to approach this problem?	
1) Easier case: The best expert makes NO mistakes	
-> Halving algorithm:	
-> Maintain a pool S of "trust verthy" experts	
-> At first, S= all experts	
-> At dayt:	
-> Go with majority prediction of only ex	perts in S
-> After seeing X, remove from S. a	M experts
-> After seeing X+, remove from S, a (Preming of S) that mis predic	ted
( [ramms or 3)	
Exercise: How good is this also it we moved promo	52

