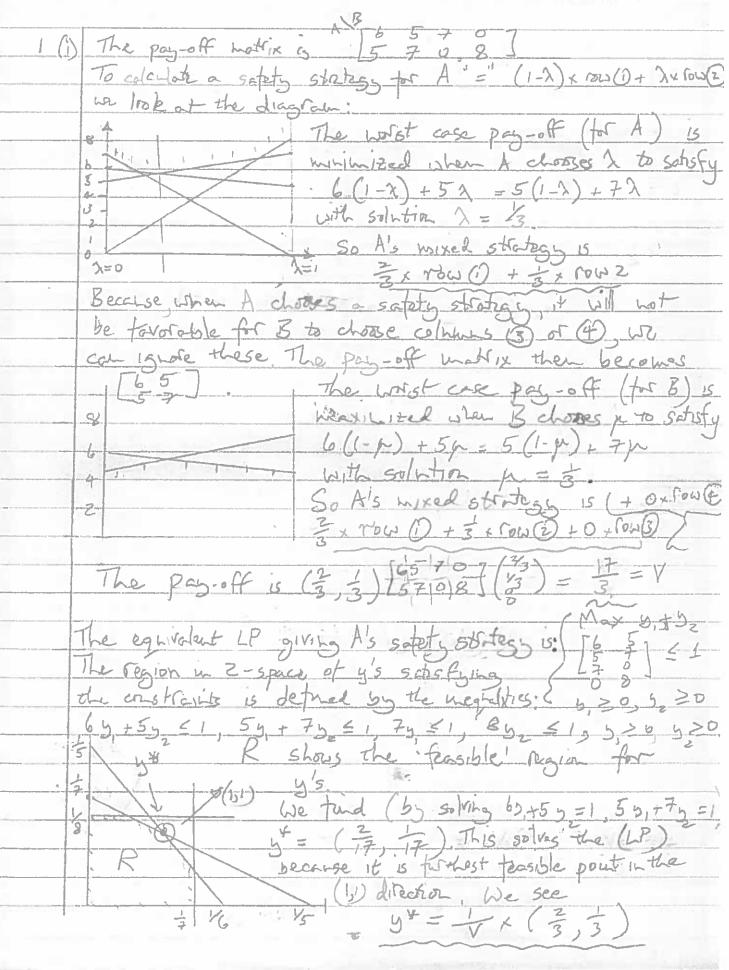
Model Answers to 2017 Game Theory Exam



2017 Game Theory Exam

0	In. P 24 may loo line test 1 4
	A: L Because Player A remembers his first action the
	B: Statemes to lacer & are
	A EAR AI = (E), A2 = (E), A3 = (E), A4 = (E), O1
	(A5)=(R), K6=(B)
	tor the given 5-paper intormation
	gets the strategies for Placer B are
	B1 = SL if A = LAM R2= /1 if A = LAM
	Sets, the strategies for Player B are BI = SL if A = LAM, B2: (L if A = LAM) L if A = R R if A = R
	B3 = SR if A = L & M B4 = (R if A = L & M R if A = R
,	R if A=R
	The pry-offs for the literant doices are
	The pry-offs for the liferent chaices are ABI BI BZ B3 154
	BI LLL=0 LLL=0 LRL=-1 LRL=-1
	AZ LLR=1 LLR=1 LRR=0 LRR=0
	AZ MLL=0 MLL=0 MRL=1 MRL=1
	AF MLR=1 MLR=1 MRR=0 MRR=0
	A5 R.L.L=0 RRL=-1 R.R.L=-1 RLL=0
ŀ	A6 RLR=0 RRR=-1 RRR=-1 RLR=0
	A-\3
	-> +1 +1 0 0 4 dominatel
	tititi o o a dominatel
	A ("western) dominated
	The second of the second
	column 3 is vealedy dominated (by 18W1)
	as which is is variety downated (35 Olivan 4)
	Theo as 3 Nort en lite: (i Die chatain).
	There are 3 Nash equilibria (in pur strategies):
	(A1,81) = LLL (A5,81) = RLL (ALBI) = RLR
	12 Call Ad a Call IV and a Call IV Call Call IV Call I
	All these Nosti equilibria, ou admissible.

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Consider the fillring even? (a) A, & Player I does up and Players 2, 1, N divide up? A. & Player I does not at least one of the players 2. N does not don't pp? A. & Player I does not did up? The sortisfaction levels for player I are: 2. N does not don't pp? A. & Player I does not did up? The sortisfaction levels for player I are: 2. N does not don't pp? A. & Player I does not did up? The sortisfaction levels for player I are: 2. N does not for the course 3. A occurs 4. A occurs 5. A occurs 6. A occurs 6		
A: SPlayer I does up and Players 2,, N alines up S A: SPlayer I does up and at least one of the players 2 N door not don't up S The satisfaction levels for player I are: 2 N door not don't up S The satisfaction levels for player I are: 2 N door not don't up S The satisfaction levels for player I are: 2 N door not don't up S The satisfaction levels for player I are: 2 N door not see a course of probability B Probabilities for the N-player De assure that 0 < 2 < 1 Toke. a course of the probability B Probabilities for the N-player De assure that 0 < 2 < 1 Toke. a course of the probability B Probabilities for the N-player De assure that 0 < 2 < 1 Toke. a course of the probability B Probabilities for the N-player De assure that 0 < 2 < 1 Toke. a course of the probability B Probabilities for the N-player De assure that 0 < 2 < 1 Toke. a course of the probability B Probabilities for the N-player Dead of the Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Second of the Splayer 1 dials up St. Prob Splayer 2 N did Splayer 1 dials up St. Prob Splayer 2 N did Splayer 1 dials up St. Prob Splayer 2 N did Splayer 1 dials up St. Prob Splayer 2 N did Splayer 1 dials up St. Prob Splayer 2 N did Splayer 1 dials up St. Prob Splayer 2 N did Splayer	3	Consider the fillning events
A: S Player I dolls up and at least one of the player 2 N down Lot did up ? The satisfaction levels for player I are: 20tis fecture level = -1 if A occurs	(0)	A: EPlayer 1 dials inp and Players 2 N dials up?
A. S Player I does not did up? The satisfaction levels for player I are sotisfaction levels for player I are sotisfaction level = -1 if A occurs i = 13 f A occurs Let (B B) be a symmetric collection of probabilities for the N-player. He assume that oc g = 1 Take wirther or the first player. Tay eff (B B B) B = (-1) Probs A, 3 + 3 Probs A 2 + 0 Probs A 3. Pay off (B B B) B = (-1) Probs A, 3 + 3 Probs A 2 + 0 Probs A 3. Probs A, 3 = Probs Player I dids up? Probs (Player Z. N dids) Robs A, 3 = Probs Player I dids up? Probs (Player Z. N dids) Robs A, 3 = Probs Player I dids up? (by undependence) B x B N-1 B x (1 - B N-1) Probs A 3 = Probs Player I dids up? (1 = Probs Prob 2. N) Probs A 3 = Probs Player I dids up? (1 = Probs Prob 2. N) Probs A 3 = Probs Player I dids bot lind up? = (1-B) So pay-off is -1 x B x B N-1 + 3 x B (1-B N-1) + D x B - B N-1 + 3 (1 - B N-1) B If this is maximized over B at B (see (b)) the slope - B N-1 + 3 (1 - B N-1) = 0 Committee Trials when all subscripters did my The probability = B B B B B N-1 = 3/4 (4) P(N) P(N) A		A: SPlayer I dials up and at least one of the players
A: S Player I does not did up? The satisfaction levels for player I are: sotisfaction level = -1 if A, occurs = +3 if A occurs i = 0 if A occurs Let (B, B) be a symmetric collection of probabilities for the N-player He assume that of probabilities for the N-player He assume that of the first player Payeff (BB. B) = (-1) Probs A 3 + 3 Probs A 2 + 0 Probs A 3 Probs A 3 + 0 Probs A 3 + 3 Probs A 2 + 0 Probs A 3 Probs A 3 - Probs Player I dids up 3 Probs Probs Probs Probs A 3 Probs A 3 - Probs Player I dids up 3 Probs Probs Probs Probs A 3 Probs A 3 - Probs Player I dids up 3 Probs Probs Probs Probs A 3 Probs A 3 - Probs Player I dids up 3 Probs Probs Probs A 3 Probs A 3 - Probs Player I dids up 3 Probs Probs Probs A 3 Probs Probs Probs A 3 Pro		Z. N LOW Lot did up?
The satisfaction levels for player 1 are: sotisfacture level = -1 if A occurs i = 13 if A occurs i = 0 if A3 occurs let (B B b be a symmetric collection of probabilities for the N-players He assure that o < 8 < 1. Take arrition for the trist player let (B B B C B C B C B C B C B C B C B C B		
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Let (B B) Be a symmetric collection of probabilities for the N-player De assure that 0 < g < 1 Take another orbital probability B for the 1st player Than, for the trist player Payoff (B, B, B) = (-1) ProbSA, 3 + 3 ProbSA, 3 + 0 ProbSAS Payoff (B, B, B) = (-1) ProbSA, 3 + 3 ProbSA, 3 + 0 ProbSAS PabSA, 3 - ProbS Player I dials up 3x ProbSA, 3 + 0 ProbSAS ProbSA, 3 = ProbS Player I dials up 3x ProbSP ProbS ProbS. N lids (by undependence) = B x B		= 0 if A occurs
probabilities for the N-player ble assure that 0 < \$ < 1\$ Toke another arbitral probability \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	6	Let (B B) be a symmetric collection of
O' = 8 = 1 Toke. another arbitral probability B Bot the 1st place Than, for the first place Pay off (BB, B) = (-1) ProbSA, B + 3 ProbSA, B + 0 ProbSA, ProbSA, B = ProbS Place I dids up 3x ProbSA, B + 0 ProbSA, ProbSA, B = ProbS Place I dids up 3x ProbSProb 2. N dids (by independence) = Bx B ProbSA, B = ProbS Place I dids up 3x ProbSProb 2. N ProbSA, B = ProbS Place I dids up 3x ProbSProb 2. N ProbSA, B = ProbS Place I dids up 3x ProbSProb 2. N ProbSA, B = ProbS Place I dids up 3x ProbSProb 2. N ProbSA, B = ProbS Place I dids up 3x B (1 = ProbSProb 2. N) ProbSA, B = ProbS Place I dids up 3x B (1 = Bril) + 0.B So pay-off is -1 x B x B N-1 + 3 x B (1 - Bril) + 0.B [F this is maximized over B at B (see (b)), the slope - B N-1 + 3 (1 - B N-1) = 0 A B N-1 = B So B = (3/4) (N-1) The probability = B N = B So B = (3/4) (N-1) ProbBobility = B N = B So B = (3/4) (N-1) ProbBobility = B N = B So B = (3/4) (N-1) ProbBobility = B N = B So B = (3/4) (N-1)	i photo shadan dilibida salishi sa	probabilities for the N-players. He assure that
The 1st player. Then, for the first player Pay off (B, B, B) & Pay off (B,, B). Proposition But (4) Proposit		0 < 8 < 1. Toke another arbitraly probability & for
Pay off (B,B, B) = (-1) ProbSA, 3 + 3 ProbSA, 2 + 0 ProbSA, ProbSA, 3 - ProbSPlayer I dials up 3x ProbSA, 2 2 + 0 ProbSA, (by undependence) = Bx B RobSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) RobSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 3x (1 = ProbSProbSProb 3x (1 = ProbSProbSProbSProb 3x (1 = ProbSProbSProbSProbSProbSProbSProbSProbS		the 1st player. Then, for the trat player
Pay off (B,B, B) = (-1) ProbSA, 3 + 3 ProbSA, 2 + 0 ProbSA, ProbSA, 3 - ProbSPlayer I dials up 3x ProbSA, 2 2 + 0 ProbSA, (by undependence) = Bx B RobSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) RobSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 2N) ProbSA, 3 = ProbSPlayer I dials up 3x (1 = ProbSProbSProb 3x (1 = ProbSProbSProb 3x (1 = ProbSProbSProbSProb 3x (1 = ProbSProbSProbSProbSProbSProbSProbSProbS		Payoff (B, B) & Payoff (B, B).
Prob SA 3 - Prob SPlayer I dulo up (X Prob SPlayer 2. N lids) (by undependence) = B x B		Since (6) 1 (5 a Nosh equilibrium But (4)
Prob SA 3 - Prob SPlayer I dulo up (X Prob SPlayer 2. N lids) (by undependence) = B x B	tellombent -	Pay off (BB. B) = (-1) ProbSA, 3 + 3 ProbSA, 2 + 0 ProbSA
$= \beta \times \beta^{N-1} $ $= $		Pab (A > - Prob (Planer) dials up (X Prob Stayer 2. N 2105
Frobs A $S = Probs P(aset Ainsups + (1=1135) 1 rob 2N)$ $Probs A_3 = Probs P(aset Ainsups + (1=1135) 1 rob 2N)$ $Probs A_3 = Probs P(aset Ainsups + Ain$		(by independence)
Frobs A $S = Probs P(aset Ainsups + (1=1135) 1 rob 2N)$ $Probs A_3 = Probs P(aset Ainsups + (1=1135) 1 rob 2N)$ $Probs A_3 = Probs P(aset Ainsups + Ain$		= Bx B all dulup 3/
Rob(A3 = Prob(Play 1 1000 pot link up? = (1-16) So pay-off is -1 x B x B N-1 + 3 x B (1-16) + 0x B = (-B^N-1 + 3 (1-16)) B If this is maximized over B at B (see (4)) the slope - B^N-1 + 3 (1-16) = 0 So B = (3/4) (N-1) The probability = BN = B x B x B x B x B x B x B x B x B x B	and in the framework with the same of the same ways and the same of the same o	ProbSA 3 = ProbSPlayer I dials up (1 = 1 rob) Prob 2 N
So pay-off is -1 x B x B N-1 + 3 x B (1-B") + 0x B = (-B") + 3 (1-B") B If this is maximized over B at B (see (b)) the slope - BN-1 + 3 (1-B") = 0 4 BN-1 = 3 - So B = (3/4) (N-1) The probability = BN = B x BN-1 - 3/4 (3/4).		$= G \times (1 - \overline{\beta}^{N-1})$
1 this is maximized over B at B (see (b)) the slope - BN-1 + 3 (1- BN-1) = 0 - BN-1 = 3 - So B = (3/4) (N-1) - Communication fails when all subscribers did in The probability = BN = B - B - 3/4 (3/4). - P(N) + P(N) + 3/4 (3/4).		1700 (A3 } = Prob(Play 1 100 Lot 212 Lps = (1-1)
1 this is maximized over B at B (see (b)) the slope - BN-1 + 3 (1- BN-1) = 0 - BN-1 = 3 - So B = (3/4) (N-1) - Communication fails when all subscribers did in The probability = BN = B - B - 3/4 (3/4). - P(N) + P(N) + 3/4 (3/4).	-	SO pay-off 15 -1 x B x B - + 3 x B (1- B"-) + 8x B
(b) Communication fails when all subscribers dial in The probability = B" = B B BN=1 = 3/4 (3) N-1 p(N) P(N) A B 3/4		$= \frac{(-\beta'' + 3(1-\beta'''))\beta}{(1-\beta'''')}$
(b) Communication fails when all subscribers dial in The probability = B" = B B BN-1 = 3/4 (3) N-1 p(N) P(N) A 3/4	and the state of t	
(b) Communication fails when all subscribers dial in The probability = BN = B BN = 3/4 (3)		
	/. >	=> 4 B" = 3 So S = (14)
	(b)	Communication foils when all subscribers did in 13 1/1-1
	all the state of t	The probability = B = B = 3/4 (4)
L'AND SW		

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	A
4AG) [x (x,a,b) = -a-b+ 2c ((x,a,b) = ab-xa+a²- ± b²
	and 13(xa,b) = ab - 276b + b2 - # 22
	Fix oc. They for any as, 1t (x,a,) is maximized
	when 21/25 1/(2,a,b)=0 => a-b=0 => b=d
	A will disse a to schofy Tou L'(x, a, b=a) =0
	7 (2 1 2)
	=> = Sa2 - xa + c2 - ± 2 = 0 => 3a - x = 0
	This is A's satisty strategy. I or a = 3 oc.
	Likewise B's safety strategy is obtained by solving. 36 13(x,a,b)=0=> b- \(\frac{1}{2}a=>a=2b) 27
	1 (x, a, b) = 0 => b - \(\frac{1}{2}\alpha = 2\b
	ad 36b 18(x = 2b, b) = 3-5 2b^2-2xb+b^2-b 3=0
	1 X's pac - off 1 1 / x a - = x b = =) = - 3 x - 5 + x
	This is muchized when 2x = 5/6 => X = 12
	The combined strategies of X A Baren
	This is muchized when $2 \times = \frac{5}{6} = \frac{5}{2} \times = \frac{5}{12}$ The combined strategies of X A, B are $(\infty = \frac{5}{12}, \alpha = \frac{5}{36}, b = \frac{5}{24})$
	12,36
A(n)	Now assume A and B choose a and b to give a Nosh eggis
	The 3- 1/(x,a,b)=0, 3/6, 13(x,a,b)=0
	=> b-x + 2a = 0 and a-2x + 2b = 0
	These can be solved to give a=0, b=oc
	X's pay-off is 1x(x, a=0, b=x) = -x + x2
	This is mainized when 2x=1 => x==
-	Now the strategies are: (x=±, a=0, b=±)
	The state of the s
R	The est state - BA min is a may (1 (a b)?
	The safety strategy of A minimizes max(L(a, b)) By definition of pt.), max L(a,b) - L(a,5) b'ER A
	Dy de (million of pr), mex [(6,0) = [(7,1)
	Now take any act Then wext(a,b') = 1 (a,p(a))
	Park to the state of the state
	The system was condition (a der), which is
	But by the toing ency condition (a p(w) which is on the inverted response curre lies ontside the region R So L'(a, b) < L'(a, p(a)). Honce a is a safety strategy.
	DU LLa,b) < Lla, 400) Houce a B a Sattly SHATEGY.
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5 (i) The dyanic programming approach is to solve for V(x), V(x) (YE(x) = min max { Y++(f(x,n,x)) + t(x) =0,...,N-1 VN-CX) - L(X)
We assure a "saddle point" (UL(X), VL(F)) exists
to each 6=0.., N-1 and returnt values of X. Then ((hr(x), Vr(x))) is a saddle point for the dynamic game, and Vo(x) is the value of the game. (ii) For the date of given N(x)= kx+c, with k=1, C, =0 To confirm 1/6(x) has illear structed for all t, assure V6+, (x) = kb+, + CE+ C for some Rt+1>0 some CEH) The light side of (1) is (R6+1 #1) x + C6+1 + k2+1, 20 (min max v S(x) V) (2)
min max, v S(x) v = min max (h, b2) [2 1 2] (V2) the pay-off of a 24 shin game in mixed strategies. The saddle strategies (hi, v) aro ((1-p, p), (1-v, v)) whele (1-h)2+ h=(1-h)1+xh= = (==, =) (1-V)2+ Y= (1-V)1+xV = V= (2=1 =) The pay-off is $\overline{u}^2 S(x) = \frac{1}{x^2} \left(\frac{2(x-1)^2}{2(x-1)^2} + \frac{2(x-1)}{2(x-1)} + \frac{2(x-1)}{x^2} \right) = \frac{(2x-1)^2}{x^2}$ So (2) becomes (Rt+1+1) x + Ct+1 + Rt+1 x x 2 22-1 = (3k+1+1)x+ + C+1,- k+1 SO V+ (x) = k(x+ c+, where k= 3 k+1+1, C= C+- R+1 Shumary: Calculate Rt, Ct, t=0,.., N-1 from 1 R = 3 R = 1, t 1 with final values R = 1, C = 0 2 Ct = Ct +1- Rt Then the value of the game is Ryo + Co (= 86) The saddle point strategies are $\left(\overline{n(x)}, \overline{v(x)}\right) = \left(\left(\frac{x-1}{x}, \frac{1}{x}\right), \left(\frac{x-1}{x}, \frac{1}{x}\right)\right)$