Game Theory Assignments

• Find all the Nash equilibria of:

		pl.2 L	pl.2 R
pl.1	U	$1,2$	$3,2$
	D	$2,4$	$0,2$

• Find dominated actions and Nash (pure) equilibria of:

		pl.2 L	pl.2 M	pl.2 R
	t	$0,3$	$6,2$	$1,1$
pl.1	m	$2,3$	$0,1$	$7,0$
	b	$5,3$	$4,2$	$3,1$

• Find all the Nash pure equilibria of:

		pl.2 L	pl.2 M	pl.2 R
	U	$1,1$	$2,3$	$1,6$
pl.1	M	$3,4$	$5,5$	$2,2$
	D	$1,10$	$4,7$	$0,4$

• Apply the best response dynamics algorithm from different starting points:

$4,3$	$0,0$	$4,3$	$2,5$	$0,4$	$3,5$	$3,2$
$2,3$	$3,3$	$0,0$	$2,2$	$5,3$	$4,4$	$0,2$
$1,5$	$3,3$	$3,3$	$0,0$	$1,2$	$3,2$	$6,1$
$4,2$	$3,3$	$3,3$	$3,3$	$0,0$	$7,4$	$5,0$
$6,2$	$3,2$	$4,4$	$2,1$	$3,3$	$0,0$	$2,3$
$3,1$	$4,3$	$6,2$	$9,1$	$8,2$	$3,3$	$4,5$

• Produce an example of game in which the best response dynamics algorithm cycles even if there is a Nash equilibrium in pure strategies

- Find the Bayes-Nash equilibrium of:

		2.1	
		B	S
1.1	B	$2,1$	$0,0$
	S	$0,0$	$1,2$

$\omega_{2.1} = 0.8$

		2.2	
		B	S
1.1	B	$2,0$	$0,2$
	S	$0,1$	$1,0$

$\omega_{2.2} = 0.2$

$\omega_{1.1} = 0.4$

		2.1	
		B	S
1.2	B	$0,1$	$1,0$
	S	$2,0$	$0,2$

		2.2	
		B	S
1.2	B	$0,0$	$1,2$
	S	$2,1$	$0,0$

$\omega_{1.2} = 0.6$

Economic Mechanisms Assignments

- Design a VCG mechanism (a Groves mechanism with Clarke pivot) in which there are two units of a single good and each buyer is interested in buying only one unit.
  Apply the mechanism with $N = \{1, 2, 3, 4\}$, $\theta_1 = 3$, $\theta_2 = 2$, $\theta_3 = 4$, $\theta_4 = 1$

- Design a VCG mechanism for reverse auctions with single unit (that is the auctioneer is the buyer, and the sellers are the bidders)

- Design a VCG mechanism that is strictly budget balanced

- Design a truthful mechanism that is: individually rational and strictly budget balanced (each agent can have different preferences over two items)

- Produce a graphical proof that with Myerson payments and monotonic allocation functions, truthfully reporting is optimal