

**PROBLEM SET 2**

Do problems:

*Yellow text:* 5.3, 6.4, 6.5, 7.4, 7.6, and 7.7

*Blue text:* 4.3, 6.4, 6.5, 7.2, 7.4, and 7.5

**Additional problems:**

1. For each of the following eleven games, say what strategy combinations are consistent with (i) rationalizability and (ii) Nash equilibrium:

	L	R
U	6, -3	0, -4
D	-1, -1	2, 2

Game A

	L	R
U	1, 6	3, 7
D	-1, -1	4, 2

Game B

	L	R
U	0, 0	0, 0
D	0, 0	0, 0

Game C

	L	R
U	6, -3	0, 1
D	1, 1	2, 2

Game D

	L	R
U	1, 1	-3, -3
D	-1, -1	4, 2

Game E

	L	R
U	1, 0	0, 0
D	0, 0	0, 0

Game F

	L	R
U	2, 2	2, 2
D	-1, -1	2, 2

Game G

	L	R
U	1, 6	3, 5
D	3, 5	1, 6

Game H

	L	R
U	1, 0	1, 1
D	0, 0	0, 1

Game I

	L	C	R
U	0, 0	0, 0	0, 1
M	1, 0	6, -9	-4, -8
D	0, 0	20, 9	10, 5

Game J

	L	C	R
U	8, 0	8, 10	10, 8
M	0, 0	60, 9	10, 8
D	2, 0	20, 9	10, 8

Game K

2. Consider this game:

	E	F	G	H
A	-8, 0	-8, 100	-8, 100	100, -8
B	0, 0	40, 100	60, -9	10, -8
C	2, 0	50, -10	20, -9	10, -8

D	8, 6	8, -10	8, -9	10, -8
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- What strategies by player 1 are consistent with him being rational?
- What strategies by player 1 are consistent with him being rational and knowing that player 2 is rational?
- What strategies by player 1 are consistent with him being rational and knowing that player 2 is rational and knowing that player 2 knows that he is rational?
- What strategies by player 1 are consistent with him being rational and knowing that player 2 is rational and knowing that player 2 knows that he is rational and knowing that player 2 knows that he knows that player 2 is rational?
- What strategies by player 1 are consistent with him being rational and knowing that player 2 is rational and knowing that player 2 knows that he is rational and knowing that player 2 knows that he knows that player 2 is rational and knowing that player 2 knows that he knows that player 2 knows that he is rational?
- What strategies by player 1 are consistent with him being rational and knowing that player 2 is rational and knowing that player 2 knows that he is rational and knowing that player 2 knows that he knows that player 2 is rational and knowing that player 2 knows that he knows that player 2 knows that he is rational and knowing that player 2 knows that he knows that player 2 knows that he knows that player 2 is rational?

3. Consider the following game:

	L	R
U	a, b	0, 0
D	0, 0	c, d

- For what values of a, b, c, and d will player 1 choose D no matter his beliefs?
- For what values of a, b, c, and d is (U, L) the unique rationalizable outcome in this game? (Be careful on this one.)
- For what values of a, b, c, and d are both (U, L) and (D, R) pure-strategy Nash equilibria?

**For extra fun:**

- Prove that for any a, b, c, and  $d > 0$ , there is a mixed-strategy Nash equilibrium to this game. (Note that one way to prove this is to actually calculate the Nash equilibrium as a function of a, b, c, and d.)
- Find values of a, b, c, and d such that there are *two* pure-strategy Nash equilibria and *no* mixed-strategy Nash equilibrium?