

Problem Set 2

Exercise 1. Consider the game below.

- Find all its pure strategy equilibria.
- Find all its mixed strategy equilibria.

	A	B	C	D
X	-1,2	2,0	2,-1	1,0
Y	0,0	0,3	0,2	4,1
W	2,-1	2,0	-1,2	1,0
Z	0,3	1,3	0,1	1,4

Exercise 2. Each of two players chooses a positive integer. If player i 's integer is greater than player j 's integer and less than three times this integer then player j pays \$1 to player i . If player i 's integer is at least three times player j 's integer then player i pays \$1 to player j . If the integers are equal, no payment is made. Each player's preferences are represented by her expected monetary payoff.

- Show that the game has no Nash equilibrium in pure strategies.
- Show that the pair of mixed strategies in which each player chooses 1, 2, and 5 each with probability $1/3$ is a mixed strategy Nash equilibrium.
- Are there other mixed strategy Nash equilibria?

Exercise 3. General A is defending territory accessible by two mountain passes against an attack by general B . General A has three divisions at her disposal, and general B has two divisions. Each general allocates her divisions between the two passes. General A wins the battle at a pass if and only if she assigns at least as many divisions to the pass as does general B ; she successfully defends her territory if and only if she wins the battle at both passes.

- Formulate this situation as a strategic game.
- Find all the mixed strategy equilibria of this game.
- In an equilibrium do the generals concentrate all their forces at one pass, or spread them out?