Methods of optimal solutions retake exam. 19.09.2014. Variant A.
Time allowed: 80 minutes. The use of calculators is not permitted.

1. Consider the following bimatrix game:

	D	E	F
A	4;2	2;1	2;0
B	-2;7	4;6	2;3
C	1;1	3;0	3;2

   (a) Find all the pure and mixed Nash equilibria

   (b) State whether the equilibria you have found are Pareto-optimal

2. Solve the system of differential equations:

$$\begin{cases} \dot{x} = x - y + 1 \\ \dot{y} = 2x - y \end{cases}$$

3. For any real number λ, find the minimal value of the objective function $x_1+2x_2+6x_3+4x_4$ subject to the constraints $\lambda x_1 - x_2 + x_3 + x_4 \geq -1$, $2x_1 + 2x_2 + 3x_3 + 2x_4 \geq 10$, all the choice variables are nonnegative.

4. Minimize $(x-2)^2 + 2(y-1)^2$ subject to $x + 4y \leq 3$ and $x \geq y$.

Methods of optimal solutions retake exam. 19.09.2014. Variant B.
Time allowed: 80 minutes. The use of calculators is not permitted.

1. Consider the following bimatrix game:

	D	E	F
A	3;2	1;1	1;0
B	-3;7	3;6	1;3
C	0;1	2;0	2;2

   (a) Find all the pure and mixed Nash equilibria

   (b) State whether the equilibria you have found are Pareto-optimal

2. Solve the system of differential equations:

$$\begin{cases} \dot{x} = x - y \\ \dot{y} = 2x - y + 1 \end{cases}$$

3. For any real number λ, find the minimal value of the objective function $x_1+2x_2+6x_3+4x_4$ subject to the constraints $\lambda x_1 - x_2 + x_3 + x_4 \geq -1$, $2x_1 + 2x_2 + 3x_3 + 2x_4 \geq 10$, all the choice variables are nonnegative.

4. Minimize $4(x-1)^2 + 2(y-2)^2$ subject to $y + 4x \leq 3$ and $x \leq y$.