Methods of optimal solutions retake exam. 02.10.2014. Variant A.
Time allowed: 80 minutes. The use of calculators is not permitted.

1. Solve the system of difference equations:

$$\begin{cases} x_{t+1} = x_t - y_t + 1 \\ y_{t+1} = 2x_t - y_t \end{cases}$$

2. 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.

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

4. 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

Methods of optimal solutions retake exam. 02.10.2014. Variant B.
Time allowed: 80 minutes. The use of calculators is not permitted.

1. 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.

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

3. Solve the system of difference equations:

$$\begin{cases} x_{t+1} = x_t - y_t - 1 \\ y_{t+1} = 2x_t - y_t \end{cases}$$

4. 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