Methods of optimal solutions retake exam. 21.09.2016. 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 pure Nash equilibria

   (b) Find all mixed Nash equilibria

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. If you can't solve for arbitrary λ then solve for $\lambda = 0$.

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