**Final. Variant I.**

1. (6 points) Find parameters α and β for which best fits to the following points:   
   (1, 1), (2, 2), (4, 2).
2. (5 points) Find for .
3. (5 points) For which α and β quadratic form Q is positive definite? Negative definite?
4. (5 points) Find extrema of.
5. (2 point) Write down the system (and matrix) for the following differential equation:  
   (1 point) Is this system stable?
6. (5 points) Solve the following system of differential equations:
7. (4 points) Write down the matrix of the linear transformation, which is performing the following:  
   - first, rotates every vector to 45 degrees clockwise around OX  
   - and then project onto plane, which is goes through points (0,0,0), (1,0,1,), (0,1,1)
8. (4 points) Find the volume of the triangular pyramid with vertices (0, 9, 7), (1/2, -3, 1), (-3, 1, 2), (4, 2, 0)
9. (3 points) 3 Theoretical questions for true/false  
   - AB and BA have the same determinants  
   - If eigenvalues of A 2, 2, 5 then the matrix is certainly invertible  
   - If we know T(v) for n different nonzero vectors in (where T(v) – linear transformation), then we know T(v) for every vector in .

**Final. Variant II.**

1. Find parameters α and β for which best fits to the following points:   
   (1, 2), (2, 1), (4, 1).
2. Find for
3. For which α and β quadratic form Q is positive definite? Negative definite?
4. Find extrema of.
5. Write down the system (and matrix) for the following differential equation:
6. Solve the following system of differential equations:
7. Write down the matrix of the linear transformation, which is performing the following:  
   - first, rotates every vector to 45 degrees counterclockwise around OY  
   - and then project onto plane, which is goes through points (0,0,0), (1,0,-1,), (0,1,-1)
8. Find the volume of the triangular pyramid with vertices (2, -1, 1), (5, 5, 4), (3, 2, -1), (4, 1, 3)
9. (3 points) 3 Theoretical questions for true/false  
   - The determinant of A ­­– B equals detA – detB  
   - If eigenvalues of A 2, 2, 5 then the matrix is certainly diagonalizable  
   - The transformation T transposes every matrix. Then = identity transformation