VARIANT 1

Full name:	Group:

Task:	1	2	3	4	Total
Score:					

In each sheet, you **should** write your last name, first name, variant number, and group number in the **upper right** corner. Unsigned sheets or sheets without the information above will NOT BE graded.

1. (5 points)

   Find the equations of directrices and coordinates of focus (or foci) of the following curve: $x^2 - 2x + y = 0$

2. (5 points) Find the equation of an ellipse (major axis is horizontal), if it is known that the eccentricity equals 0.5 and the distance from its focus to the nearest vertex is 2.

3. (3 points) Find the equations of the tangent and normal lines to the curve defined by the equation $x^2 - xy - y^2 + x + y = 0$ at the point with coordinates $(0.6, 1.2)$.

4. (5 points) In a triangle $\triangle ABC$ have vertices with coordinates $A(2, 0); B(-1, 2), C(-1, -2)$.

   (a) Find the transform that maps each vertex of the triangle to the middle point of the opposite side.

   (b) Find the fixed point of the transform.

   (c) How the area of the transformed triangle relates to the area of the triangle $\triangle ABC$.

VARIANT 2

Full name:	Group:

Task:	1	2	3	4	Total
Score:					

In each sheet, you **should** write your last name, first name, variant number, and group number in the **upper right** corner. Unsigned sheets or sheets without the information above will NOT BE graded.

1. (5 points)

   Find the equations of directrices and coordinates of focus (or foci) of the following curve: $25x^2 - 144y^2 - 864y - 50x - 4871 = 0$

2. (5 points) Find the equation of parabola if it is known that the equation of directrix $y = -3$. Focus of the parabola has coordinates $(0, 1)$.

3. (3 points) Find the equations of the tangent and normal lines to the curve defined by the equation $\frac{(x-3)^2}{4} + \frac{y^2}{9} = 1$ at the point with coordinates $(1.4, 1.8)$.

4. (5 points) In a triangle $\triangle ABC$ have vertices with coordinates $A(1, 0); B(-\frac{1}{2}, 1), C(-\frac{1}{2}, -1)$.

   (a) Find the transform that maps each vertex of the triangle to the middle point of the opposite side.

   (b) Find the fixed point of the transform.

   (c) How the area of the transformed triangle relates to the area of the triangle $\triangle ABC$.