10.1. For each of the equations in Table 10.2 , discuss the geometric locus of points satisfying them.

10.2. For each of the following equations write down the associated matrix and bring the equation in isometric canonical form.

a) $-x^2+xy-y^2+x=0$,

b) $6xy+x-y=0$.

10.3. In each of the following cases, decide the type of the quadratic curve based on the parameter $a\in\mathbb{R}$.

a) $x^2-4xy+y^2=a$,

b) $x^2+4xy+y^2=a$.

10.4. Consider the rotation R_{90° of $\mathbb{E}^2$ around the origin and the translation $T_{\mathbf{v}}$ of $\mathbb{E}^2$ by the vector $\mathbf{v}(1,0)$.

a) Give the matrix form of the isometries R_{90°, $T_{\mathbf{v}}$ and $T_{\mathbf{v}}\circ R_{90^\circ}$.

b) Determine the equations of the hyperbola $\mathcal{H}:\frac{x^2}{4}-\frac{y^2}{9}-1=0$ and the parabola $\mathcal{P}:y^2-8x=0$ after transforming them with R_{90° and with $T_{\mathbf{v}}\circ R_{90^\circ}$ respectively.

10.5. Discuss the type of the curve

$$x^2+\lambda xy+y^2-6x-16=0$$

in terms of $\lambda\in\mathbb{R}$.

10.6. Using the classification of quadrics, decide what surfaces are described by the following equations.

a) $x^2+2y^2+z^2+xy+yz+zx=1$,

b) $xy+yz+zx=1$,

c) $x^2+xy+yz+zx=1$,

d) $xy+yz+zx=0$.