Mathematics for Computer Graphics
Geometric Transformations in the Plane

Assoc. Prof. Iva Dokuzova
Department of Algebra and Geometry
University of Plovdiv "Paisii Hilendarski", Bulgaria

The most efficient language in computer geometry and graphics is provided by vector algebra. With this instrumentarium, we can solve problems with coordinate system transformations, affine transformations, projective transformations in the plane and 3D-space. We use matrices and calculations with matrices to represent and transform geometric objects (points, lines, figures) by shearing, rotation, scaling, reflection (symmetry, mirroring), and translation. By these transformations, we can manipulate shapes to create new ones, and we can also express relationships between coordinate systems in a virtual world. To transform a shape (a figure, a surface), we only need to transform its defining vertices.

Bibliography

1. J. Vince. Geometry for Computer Graphic, Springer London, 342 p., 2005.

2. D. Salomon. Curves and Surfaces for Computer Graphics, Springer New York, 2006.

3. Н. В. Соснин, Компьютерная графика, ИПК СФУ, Красноярск, 138 стр., 2007.