INTERREG IIIA Community Initiative Program HUSER0602/066S University of Szeged

*Mathematica*l and visualizaton packages: *Mathematica 6*

Table of Contents

Vectors, Matrices, Linear Algebra

Linear Algebra: vectors, matrices, transformations, eigenvalues, eigenvectors, etc.

Elementary study of functions

Inverse function
Animate the definition of Sin[x]
Lissajous curves
Plot functions in different coordinate systems

Calculus

Calculus summary

Examples in 1D Calculus

Tangent line and secant lines
Animation of the tangent lines
Zooming
Investigation of functions
Taylor polynomials
Animation of trigonometric series

Applications in 2D-3D Calculus

Calculus methods: partial derivatives, ..., maxima and minima
Tangent planes and normal vectors of surfaces
Tangent vectors and normal planes of curves
Maxima and minima: the numerical and visual point of view
Constrained extrema

Complex numbers, complex functions

Summary and examples

Programming

Data structures

Data structures, head operations and parameter-type check
Advanced list operations, list programming

Recursions, iterations

Summary and basic examples

Examples: recursion vs. nesting

Factorial
Continued fractions

Simple numerical algorithms

Fixedpoints of mappings
Newton iterations

Exercises

References