



Braunschweig, 9th of January 2017

Mathematics for engineers II (Linear algebra)

1 algebraic structures

number domains, group, field, modulo

complex numbers, cartesian and polar form, Euler's identity, roots of complex numbers, unit roots
polynomials, polynomial division, linear factors, fundamental theorem of algebra

2 vectors and vector spaces

Euclidean and further vector spaces, subspace, linear combination, span

linear independence, basis, dimension, norm, examples of norms, scalar product, projection, ortho-normal basis, Cauchy Schwarz inequality

3 linear maps and matrices

surjective, injective and bijective maps, inverse map, linear map
matrices, kernel, rank, inverse matrix, determinant, matrix norm

4 Gaussian algorithm

trapezoid form, underdetermined systems, parameter dependent solutions, inverse matrix

5 eigenvalues and eigenvectors

properties, diagonalizable matrices, eigenvectors of symmetric matrices, Jordan form, similarity

6 vectors in geometry

lines and planes, Hesse normal form, intersection points, vector product, triple product
transformation of coordinates, rotations and reflections, principal axis theorem