lgebra, Topology, Differential Calculus, and

Optimization Theory

For Computer Science and Machine Learning

In the following four chapters, the basic algebraic structures (groups, rings, fields, vector

spaces) are reviewed, with a major emphasis on vector spaces. Basic notions of linear alge-

bra such as vector spaces, subspaces, linear combinations, linear independence, bases, quo-

tient spaces, linear maps, matrices, change of bases, direct sums, linear forms, dual spaces,

hyperplanes, transpose of a linear maps, are reviewed.