A Mathematical Appendix

Much of the theory and practice of finance is drawn on quantitative tools and techniques of mathematics, statistics, and econometrics. In particular, for basic courses in finance we need knowledge in calculus of functions in one and more variables, basics of vectors and matrices, as well as probability calculus and statistics.

In these notes I summarize some important concepts of differential calculus and probability and present additional graphical illustrations. Most of the notes are taken from the lecture notes of my Bachelor's courses.

There exist many books on mathematics for economics and quantitative methods in finance and many websites giving an introduction to mathematical concepts. I recommend the following literature:

References

[1] T. J. Watsham and K. Parramore, Quantitative Methods in Finance, International Thompson Business Press, 1997.

A book that covers elementary mathematics, linear algebra, calculus, and statistics including finance applications (also spreadsheet applications), as well as mathematics of time value is:

[2] J. L. Teall and I. Hasan, Quantitative methods for finance and investments, Blackwell Publishing, 2002.

On basic concepts and linear algebra (vectors and matrices)

[3] J. Leydold, Bridging Course Mathematics (MSc Economics), Handouts, Institute for Statistics and Mathematics, WU Wien, 2018.
`http://statmath.wu.ac.at/courses/MEC_bridgingmath/download/handouts/`

[4] J. Leydold, Mathematics 1 for Economics: Linear Spaces and Metric Concepts, Institute for Statistics and Mathematics, WU Wien, 2018.
`http://statmath.wu.ac.at/courses/mvw_math1/download/Mathematics_1_oneside.pdf`

On differential calculus:

[5] J. Leydold, Mathematics 2 for Economics: Analysis and Dynamic Optimization, Institute for Statistics and Mathematics, WU Wien, 2018.
`http://statmath.wu.ac.at/courses/mvw_math2/download/Mathematics_2_oneside.pdf`

[6] K. Binmore and J. Davies, Calculus – Concepts and Methods, Cambridge University Press, 2001.

[7] A. C. Chiang and K. Wainwright, Fundamental Methods of Mathematical Economics (4th ed), McGraw Hill, 2005.

A good review on optimization problems is

[8] D. Léonard and N. Van Long, *Optimal control theory and static optimization in economics*, Cambridge University Press, 1992, ch. 1 "Static optimization".

On probability:

[9] D. Ruppert, Statistics and Finance - An Introduction, Springer, New York, 2004, ch. 2.

[10] J. R. Buchanan, An Undergraduate Introduction to Financial Mathematics (3rd ed), World Scientific Publishing Company, 2012.