

MATHEMATICS.

DIPLOMATURA DE CIENCIAS EMPRESARIALES. 2004/2005

1. Matrices and determinants.

Definitions. Matrix operations. Determinants and their properties. Inverse matrices. Rank.

2. Vector spaces.

Definitions. The vector space \mathbb{R}^n . Linear dependence and independence. Subspaces. Bases. Scalar products. Norm of vectors.

3. Linear transformations.

Definitions. Elementary properties. Matrix formulation. Kernel and image of a linear transformation.

4. Eigenvalues and diagonalization.

Eigenvalues and eigenvectors of a matrix. Characteristic polynomial. Diagonalization.

5. Quadratic forms.

Definition. Matrix formulation. Diagonal formulations. Sign. Quadratic forms subject to constraints.

6. Functions of several variables. Continuity.

Functions of one variable. Function of several variables. Vector functions. The concept of limit. Limits in \mathbb{R}^2 . Continuity.

7. Functions of several variables. Differentiation.

Derivatives of functions of one variable. Directional derivatives and Partial derivatives. Gradient. Differential of a function. Differentiation of vector functions. Jacobian matrix. Chain Rule. Higher order derivatives. Hessian matrix.

8. Implicit Differentiation.

Implicit function theorem. Derivatives of implicit functions.

9. Homogeneous Functions.

Definition. Properties. Euler theorem.

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10. Polynomial Aproximations of functions.

Taylor polynomial for functions of one variable. Taylor's formula. Taylor approximation for functions of several variables.

11. Multivariable optimization.

Unconstrained optimization with several variables. Optimality conditions. Optimization with equality constraints. Lagrange multiplier method. Second order conditions.

12. Integration.

Indefinite integrals. Definite integrals. Improper integrals. Multiple integrals.

13. Financial Topics.

Simple interest and discount. Compound interest and discount. Annuities. Present and future value of an annuity.

Bibliography.

Chiang A.C.: "Fundamental methods of mathematical economics". McGrawHill.

1984.

Sydsaeter K., Hammond P.: "Essential mathematics for economic analysis". Prentice Hall. 2002.

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