AM110 program. AA 2021-2022

Part 1: *School Skills Review*
Real numbers and their subsets (N, Z, Q).
Roots and properties of rational powers.
Inequalities (also graphic resolution).
Fundamental properties of exponential, logarithmic, trigonometric and inverse trigonometric functions.

Part 2*: Introduction to the concept of limit, continuity and differentiability through definitions, examples and exercises*
Definition of limit for functions from R to R.
Calculation of delta as a function of epsilon in simple cases.
Fundamental properties of limits: algebra of limits and computation of finite limits.
Infinite limits, limit of sequences.
Extended limits algebra: extension of the calculus of limits.
Continuous functions and points of discontinuity.
Derivative: definition and rules of derivation (statements). Calculation of derivatives.
Relation between derivative and monotonicity.
Convexity: definition and criteria for C^2 functions.
Applications to the qualitative study of function graphs.

Part 3*: Introduction to the concept of integral and series through definitions, examples and exercises*
Definition of Riemann integral and its fundamental properties (linearity, invariance by translation, positivity). Calculation of simple integrals using the definition.
Illustration of the fundamental theorem of integral calculus.
Calculation of Primitives: main methods (substitution, integration by parts);
Integration of rational functions and other special classes.
Numerical series. Convergence criteria: statements and applications.
Improper integrals: convergence criteria: statements and applications.

Part 4*: Elementary solving methods of differential equations*
Solution methods for special classes of ordinal differential equations (ODE) including:
First order, linear
First order with separable variables
ODE of Euler
ODE of Bernoulli
Exact ODE
ODE of second order with constant coefficients.