METODI ANALITICI PER L'INGEGNERIA I

MAT/07 - 6 CFU - 1° Semester

Teaching Staff

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DETAILED COURSE CONTENT

1. Set theory. Principle of induction. Numerical systems. Functions and function graphics. Monotone functions. Inverse function. Composite function. Absolute value. Powers. Exponentials. Logarithms. Trigonometric functions. Sets of real numbers, limits and extrema. Binomial coefficients, Newton's formula.

2. Sequences, regularity. Operations on limits. Indeterminate forms. Comparison thorems. Bernoulli inequality. Neper number. Convergence and divergence tests. Infinite limits comparison.

3. Limits of functions.Operations on function limits and indeterminate forms. zioni sui limiti e forme indeterminate. Comparison thorems. Common limits. Continuity. Points of discontinuity. Composite functions. Intermediate value theorem. Weierstrass Theorem. Continuity of inverse and monotone functions. Continuity of elementary functions.

4. Derivative. Geometric meaning. Continuity and differentiability. Differentiation rules. Composite and inverse function differentiation. Derivative of elementary functions. Higher order derivatives. Points of non differentiability, cusps. Fermat, Rolle and Lagrange theorems. Local minima and maxima. Monotonicity criteria. Concave and convex functions. De l'Hopital thorem. Asymptotes. Graph of a function.

5. Antiderivative. Integration by decomposition, by parts, by substitution. Integration of rational functions. Definite integral. Riemann integral. Properties of definite integrals. rietà degli integrali definiti. Men value theorem. Integral function. Fundamental thorem of calculus. Computation of definite integrals. Computation of areas. Improper integrals. Convergence tests.

6. Definition and character of a series. Cauchy convergence test. Necessary condition of convergence. Operations on series. Convergence tests for series: comparison test, ratio test, root test, condensation test. p-series. Absolute convergence. Alternatibg sign series. Leibniz convergence test.

TEXTBOOK INFORMATION

1) P. Marcellini - C. Sbordone, "Analisi Matematica uno" (o anche la versione sintetica "Elementi di Analisi Matematica uno"), Liguori Editore.

2) S. Salsa - A. Squellati, "Esercizi di Analisi Matematica I", Zanichelli