COMPUTER SCIENCE 349A

Handout Number 1

NUMERICAL ANALYSIS is the study of **algorithms** for solving problems of **continuous mathematics**.

key words:

continuous mathematics

-- means that **real or complex variables** are involved

-- the **floating-point** representation of real/complex numbers in digital computers is not exact, thus only **approximate solutions** can be computed: concept of **roundoff error**

algorithms

-- most problems of continuous mathematics cannot be solved exactly by **finite algorithms** using the basic arithmetic operations + - * / (for example, roots of polynomials, problems involving differentiation or integration)

-- **implication**: the algorithms used to solve these problems would not give the exact solution even if exact arithmetic were used: concept of **truncation error**

Numerical Analysis is concerned with accurate, efficient approximation of solutions to problems of continuous mathematics.

-- **applications**: most problems in science and engineering; also graphics, image processing, models of computer networks, biological systems, etc.

One aspect of numerical analysis: the study of errors.