TRINITY COLLEGE FOR WOMEN NAMAKKAL
Department of Mathematics

COMPUTATIONAL MATHEMATICS
23UMASE03 - EVEN Semester

Methods to find the roots of equation

Presented by
Mrs. M. Nandhini
Assistant Professor
Department of Mathematics
http://www.trinitycollegenkl.edu.in/

Roots of equation

A number α (real or complex) is a root of the equation f(x)=0 if f(α)=0

If the equation is either linear or quadratic we can easily find the roots.

If f(x) is a polynomial of higher degree or an expression containing transcendental functions

METHODS TO FIND THE ROOTS OF EQUATION

There are two types of methods to find the roots of equation f(x)=0.

They are

i) Direct methods

ii) Iterative methods

Direct Method

In these methods we can get the exact values of all the roots.

For example, the quadratic equation

$$ax^2 + bx + c = 0$$

The two roots are given by

$$\frac{b \pm \sqrt{b^2 - 4ac}}{2a}$$

Iterative Method

In these methods starting with one initial approximation to the root we obtain a sequence of approximation {} to the root which converges to the root
To find an approximate root such that

$$|f(\propto^*)| < \epsilon \ or \ |x_{k+1} - x_k| < \epsilon$$

where x_k and x_{k+1} are two successive approximations and ϵ is the initial approximation

There are many types of numerical methods of them the most commonly used ones may be cited as under.

1. Methods of finding the roots of an equation.

They include

- bisection method,
- Regula falsi method,
- secant method,
- Newton's method and
- Fixed point iteration method.

2.Methods of solving the system of linear algebraic equations.
- Gaussian elimination
- Linear Iterative method
- LU Factorization method
- Conjugate Gradient method
- System of nonlinear equations

3. Interpolation and regression analysis.
4. Numerical Differentiation.
5. Numerical Integration.
- Newton cotes formulas
- Romberg Integration
- Adaptive Quadrature
- Gaussian Quadrature

6. Solution of differential equation.
- Laplace equation
- Poisson equation
- One dimential heat equation
- One dimential wave equation

7. Solution of matrix problems.
8. Solution of boundary value problem.

THANK YOU

http://www.trinitycollegenkl.edu.in/