

Chapter 10

Nonlinear Equations

1 Scope of the Chapter

This chapter is concerned with the numerical solution of polynomial (*algebraic*) and nonlinear (*transcendental*) equations.

2 Available Modules

Module 10.1: `nag_polynom_eqn` — **Roots of polynomials**

Provides a procedure for:

- finding all the roots of the n th degree real or complex polynomial.

Module 10.2: `nag_nlin_eqn` — **Roots of a single nonlinear equation**

Provides a procedure for:

- finding a root of a continuous function $f(x)$ in a given interval $[a, b]$.

Module 10.3: `nag_nlin_sys` — **Roots of a system of nonlinear equations**

Provides a procedure for:

- solving a set of n nonlinear equations in n unknowns

$$f_i(x) = 0, \quad i = 1, 2, \dots, n, \quad x = (x_1, x_2, \dots, x_n)^T;$$

- validating the (*optional*) user-supplied Jacobian;
- calculating the QR factorization of the final approximate Jacobian used in analysing the sensitivity of the solution, x , to the specification of the functions $f_i(x)$.