## 1 SUMMARY

To **calculate the coefficients of a polynomial given all its roots,** the roots must be real, i.e. given real numbers $\xi_1,\xi_2,...,\xi_n$ calculate $a_0, a_1,..., a_n$ with $a_n = 1$ such that

$$a_0 + a_1 x + a_2 x^2 + ... + a_n x^n \equiv (x-\xi_1)(x-\xi_2)...(x-\xi_n)$$

**ATTRIBUTES** — **Version:** 1.0.0. **Types:** `PC01A; PC01AD.` **Original date:** August 1967. **Origin:** W.E.Hart, Harwell.

## 2 HOW TO USE THE PACKAGE

### 2.1 Argument list

*The single precision version*

```
CALL PC01A(ROOT,COE,N)
```

*The double precision version*

```
CALL PC01AD(ROOT,COE,N)
```

`ROOT` is a `REAL` (`DOUBLE PRECISION` in the D version) array which must be set by the user to the roots $\xi_i$, $i$=1, 2,...,$n$.

`COE` is a `REAL` (`DOUBLE PRECISION` in the D version) array of length at least $n$+1 in which the subroutine will return the coefficients $a_i$, $i$=0, 1, 2,..., $n$ in the elements `COE(J)`, `J=1`, 2,..., `N+1`. Note that `COE(N+1)` is always set to one.

`N` is an `INTEGER` which must be set by the user to $n$ the number of roots (also the degree of the polynomial).

## 3 GENERAL INFORMATION

**Workspace:** None.

**Use of common:** None.

**Other routines called directly:** None.

**Input/output:** None.

**Restrictions:** None.