



1 SUMMARY

To obtain the coefficients a_j , $j=0, 1, \dots, n$ of a polynomial $P(x)$ of degree n which is expressed as a linear combination of orthogonal polynomials $Q_k(x)$, $k=0, 1, \dots, n$, i.e.

$$a_0 + a_1x + \dots + a_nx^n \equiv c_0Q_0(x) + c_1Q_1(x) + \dots + c_nQ_n(x)$$

where the polynomials $Q_k(x)$ are defined by the recurrence relation

$$Q_0(x) = 1, \quad Q_1(x) = x - \alpha_0,$$

$$Q_{k+1}(x) = (x - \alpha_k)Q_k(x) - \beta_k Q_{k-1}(x) \quad k=1, 2, \dots, n-1.$$

ATTRIBUTES — **Version:** 1.0.0. **Remark:** Can be used to obtain the coefficients of polynomial fits produced by VC01A. **Types:** PE08A; PE08AD. **Original date:** April 1964. **Origin:** S.Northcliffe, Harwell.

2 HOW TO USE THE PACKAGE

2.1 The argument list

The single precision version

```
CALL PE08A( ALPHA, BETA, C, A, N)
```

The double precision version

```
CALL PE08AD( ALPHA, BETA, C, A, N)
```

ALPHA is a REAL (DOUBLE PRECISION in the D version) array which must be set by the user to the recurrence relation parameters α_i , i.e. set ALPHA(i+1) to α_i , $i=0, 1, 2, \dots, n-1$.

BETA is a REAL (DOUBLE PRECISION in the D version) array which must be set by the user to the recurrence relation parameters β_i , i.e. set BETA(i+1) to β_i , $i=1, 2, \dots, n-1$. Note that BETA(1) need not be set.

C is a REAL (DOUBLE PRECISION in the D version) array which must be set by the user to the coefficients c_i in the orthogonal polynomial expansion given in the summary, i.e. set C(i+1) to c_i , $i=0, 1, 2, \dots, n$.

A is a REAL (DOUBLE PRECISION in the D version) array of length at least $n+1$ which the routine will set to the coefficients a_i of the equivalent polynomial as defined in the summary, i.e. it will set A(i+1) to a_i , $i=0, 1, 2, \dots, n$.

N is an INTEGER variable which must be set by the user to n the degree of the polynomial. **Restriction:** $0 \leq n \leq 200$.

3 GENERAL INFORMATION

Workspace: None.

Use of common: None.

Other routines called directly: None.

Input/output: None.

Restrictions: None.