1 SUMMARY

Given a polynomial in $x$, i.e.

$$P(x)=a_0+a_1x+...+a_nx^n$$

$n \leq 50$

calculates the coefficients $b_j, j=0, 1, ..., n$ of the polynomial under a change of variable $z=ux+v$, i.e. such that

$$a_0+a_1x+...+a_nx^n \equiv b_0+b_1(ux+v)+...+b_n(ux+v)^n$$


2 HOW TO USE THE PACKAGE

2.1 The argument list

*The single precision version*

CALL PD03A(A,B,U,V,N)

*The double precision version*

CALL PD03AD(A,B,U,V,N)

A is a REAL (DOUBLE PRECISION in the D version) array which must be set by the user to contain the coefficients of the polynomial $P(x)$, i.e. set $A(i+1)=a_i, i=0, 1, 2, ..., n$. This argument is not altered.

B is a REAL (DOUBLE PRECISION in the D version) array of length at least $n+1$ in which the routine returns the coefficients of the calculated polynomial, i.e. it sets $B(i+1)=b_j, i=0, 1, 2, ..., n$.

U is a REAL (DOUBLE PRECISION in the D version) variable which must be set by the user to the value of $u$ in the change of variable $z=ux+v$. This argument is not altered.

V is a REAL (DOUBLE PRECISION in the D version) variable which must be set by the user to the value of $v$ in the change of variable $z=ux+v$. This argument is not altered.

N is an INTEGER variable which must be set by the user to $n$ the degree of the polynomial. This argument is not altered. **Restriction:** $n \leq 50$.

3 GENERAL INFORMATION

Workspace: None.

Use of common: None.

Other routines called directly: PB01A/AD.

Input/output: None.

Restrictions: $n \leq 50$. This restriction can be relaxed by recompiling with a larger dimensioned internal work array.

All use is subject to licence.
4 METHOD

If $v = 0$, the coefficients are merely multiplied by the appropriate powers of $u^{-1}$. Otherwise the coefficients of the successive derivative polynomials

$$p^{(k)}(x) = \frac{1}{k!} \frac{d^k}{dx^k} p(x) \quad k = 0, 1, 2, \ldots, n$$

are built up in a private array called $C$ and for each $k$, PB01A/AD is used to evaluate

$$b_k = u^{-1} p^{(k)} \left( \frac{-v}{u} \right).$$