

ADAS Subroutine xxnbaf

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SUBROUTINE XXNBFAF (M, NCAP7 , X, Y, W, LAMDA , B, A, DIAG, C ,  
& SS , IFAIL )
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C PURPOSE: Determines a least-square cubic spline approximation $s(x)$
C to the set of data points (x_r, y_r) with weights w_r ,
C for $r=1,2,\dots,m$.

C

C The value of $NCAP7 = ncap+7$, where $ncap$ is the number of
C intervals of the spline (number of interior knots + 1),
C and the values of the knots $LAMDA(5), LAMDA(6), \dots,$
C $LAMDA(NCAP7-4)$, interior to the data interval, are
C prescribed by the user.

C

C s has the property that it minimises ss , the sum of the
C squares of the weighted residuals $eps(r)$

C

C $eps(r) = w(r) * (s(x(r)) - y(r))$.

C

C The procedure produces the minimising value of ss and
C the coefficients $c(1), c(2), \dots, c(q)$, where $q=ncap+3=NCAP7-4$,
C in the B-spline representation

C

C $s(x) = c(1)*N1(x) + c(2)*N2(x) + \dots + c(q)*Nq(x)$.

C

C Here $Ni(x)$ ($i=1,2,\dots,q$) denotes the normalised B-spline
C of degree 3 defined upon the knots $lamda(i-4), lamda(i-3),$
C $lamda(i-2), lamda(i-1),$ and $lamda(i)$.

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C CALLING PROGRAM: VARIOUS

C

C SUBROUTINE:

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C INPUT: (I*4) M = The number of data points.
C CONSTRAINT: $M \geq MDIST \geq 4$, where
C MDIST is the number of distinct x
C values in the data.

C

C INPUT: (I*4) NCAP7 = $NBAR+7$, where NBAR is the number of
C intervals of the spline (number
C of interior knots +1, i.e. the knots
C strictly in the range $X(1)$ to $X(M)$)
C over which the spline is defined.
C CONSTRAINT: $8 \leq NCAP7 \leq MDIST+4$,
C where MDIST is the number of distinct
C x values in the data.

C

C INPUT: (R*8) X() = The values x_r of the independent variable
C (abscissa), for $r=1,2,\dots,m$.

C

CONSTRAINT:

C - PUT UNDER SCCS CONTROL
C
C VERSION: 1.2 DATE: 06-07-2004
C MODIFIED: Allan Whiteford
C - Changed name from dxnbaf to xxnbaf.
C
C VERSION : 1.3 DATE: 10-04-2007
C MODIFIED : Allan Whiteford
C - Modified documentation as part of automated
C subroutine documentation preparation.

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INTEGER	IFAIL,	M,	NCAP7	
REAL*8	A(1:NCAP7-4,2:4),		B(M)	
REAL*8	C(NCAP7),	DIAG(1:NCAP7-4)		
REAL*8	LAMDA(-3:NCAP7-4),	SS,		W(M)
REAL*8	X(M),	Y(M)		