

Subject: Extensions to INDEX intrinsic function
 From: Van Snyder
 References:

1 **1 Number**

2 TBD

3 **2 Title**

4 Extensions to INDEX intrinsic function.

5 **3 Submitted By**

6 J3

7 **4 Status**

8 For consideration.

9 **5 Basic Functionality**

10 Extend the INDEX function to generate $((i+start-1,i=1,n)/)$, and to find where an integer appears in
 11 an array.

12 **6 Rationale**

13 The idiom $((i, i=1,n) /)$ is very common. The obvious shift of it is also common. It would be useful
 14 to have a more concise spelling of it.

15 The need to find where an integer appears in an array of integers is common. It would be useful to have
 16 an intrinsic function to do this.

17 Both could be achieved by extensions to the INDEX intrinsic function, which already has the second
 18 functionality mentioned here, but only for character strings.

19 **7 Estimated Impact**

20 Minor: Two additional descriptions for an existing intrinsic function. Probably at 3 on the JKR scale.

21 **8 Detailed Specification**

22 Define INDEX(N[,START,KIND]) to generate $((i,i=1,n)/)$ if START is absent or to generate $((i+start-$
 23 $1,i=1,n)/)$ if START is present. The kind of the result is KIND if KIND is present, else default integer.

24 Define INDEX(ARRAY,PROBE[,BACK,KIND]) to return the subscript(s) of ARRAY such that PROBE
 25 is equal to an element of ARRAY indexed by those subscript(s) if there is such an element, else
 26 HUGE(0_KIND) if KIND is present or KIND(0) if KIND is absent. If BACK is present with the
 27 value true and there are several such elements, the result is for the last such element in array element
 28 order. Otherwise it is the first such element.

29 **8.1 Suggested edits**

30 The following suggested edits illustrate the magnitude of the project.

31	INDEX(N,START[,KIND])	Returns array of consecutive integers	297:14+
32	INDEX(ARRAY,PROBE[,BACK,KIND])	Returns the subscripts of an element of an	297:23+
33		integer array that has a specified value	

1 **13.7.52¹/₃ INDEX (N [, START, KIND])**

2 **Description.** Returns an array of N consecutive integers.

3 **Class.** Transformational function.

4 **Arguments.**

5 N shall be a scalar of type integer.

6 START (optional) shall be a scalar of type integer.

7 KIND (optional) shall be a scalar integer initialization expression.

8 **Result Characteristics.** Rank-one integer array of size N. If KIND is present, the kind type parameter is that specified by the value of KIND; otherwise the kind type parameter is that of default integer type.

11 **Result Value.**

12 *Case (i):* If START is absent the result value is (/ (I, I=1,N) /).

13 *Case (ii):* If START is present the result value is (/ (I+START-1, I=1,N) /).

14 **Examples.** INDEX(3) has the value (/1,2,3/). INDEX(3,5) has the value (/5,6,7/).

15 **13.7.52²/₃ INDEX (ARRAY, PROBE [, BACK, KIND])**

16 **Description.** Returns the position in ARRAY of an element whose value is equal to the value of PROBE.

18 **Class.** Transformational function.

19 **Arguments.**

20 ARRAY shall be an array of type integer.

21 PROBE shall be a scalar of type integer.

22 BACK (optional) shall be a scalar of type logical.

23 KIND (optional) shall be a scalar integer initialization expression.

24 **Result Characteristics.** Integer. If KIND is present, the kind type parameter is that specified by the value of KIND; otherwise the kind type parameter is that of default integer type. There are two cases for the rank of the result:

27 *Case (i):* If ARRAY is a rank-one array the result is a scalar.

28 *Case (ii):* Otherwise, the result is a rank one array of the same size as the rank of ARRAY.

29 **Result Value.**

30 *Case (i):* If there are no elements of ARRAY having a value equal to PROBE the result value is HUGE(0) if KIND is absent, or HUGE(0_KIND) if KIND is present.

32 *Case (ii):* Otherwise, if BACK is present with the value true, the result value is the subscript or subscripts of ARRAY such that the specified element is the last element in ARRAY, taken in array element order, that has a value equal to the value of PROBE.

36 *Case (iii):* Otherwise, the result value is the subscript or subscripts of ARRAY such that the specified element is the first element in ARRAY, taken in array element order, that has a value equal to the value of PROBE.

39 **Examples.** INDEX((/1,1,2,3/), 1, BACK=.TRUE.) has the value 2. INDEX((/1,1,2,3/), 3) has the value 4. INDEX(RESHAPE((/1,2,3,4/),(/2,2/)), 4) has the value (/2,2/).