BINPAT

PURPOSE
Compute a binary pattern of -1 and +1.

DESCRIPTION
The BINPAT function is used in the construction of Yates design matrices for 2-level full factorial designs. If one is constructing a design to examine k factors, such a Yates design will have 2^k rows and k columns. The first argument (usually a variable) designates the row numbers in the matrix and so is commonly the sequence 1 to 2^k. The second argument (usually a parameter) designates the column number in the Yates design matrix and so is commonly 1 to k. The output from the BINPAT command (usually a variable) is a series of -1's and +1's corresponding to a given column in the Yates design matrix. Thus if one were constructing a 2-level design to examine 3 factors (i.e., k=3), the Yates design matrix would consist of $2^3 = 8$ rows and k = 3 columns. The Yates design matrix could be computed with the following commands:

        LET X = SEQUENCE 1 1 8
        LET X1 = BINPAT(X,1)
        LET X2 = BINPAT(X,2)
        LET X3 = BINPAT(X,3)

This would yield the following Yates values for X1, X2, and X3:

        X1   X2   X3
        ============
        -1   -1   -1
        +1   -1   -1
        -1   +1   -1
        +1   +1   -1
        -1   -1   +1
        +1   -1   +1
        -1   +1   +1
        +1   +1   +1

SYNTAX
LET <y2> = BINPAT(<y1>,<a1>)   <SUBSET/EXCEPT/FOR qualification>
where <y1> is a variable or a parameter specifying the rows of the design matrix;
        <a1> is a parameter designating the column of the design matrix to compute;
        <y2> is a variable or a parameter (depending on what <y1> is) where the computed column of the design matrix is stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional and rarely used in this context.

EXAMPLES
LET X2 = BINPAT(X,2)
LET X3 = BINPAT(X,3)

NOTE
Yates designs can also be read directly from the various on-line design of experiment files in the DATAPLOT reference file directory. The list of available designs can be viewed by entering the command:

        LIST 2KINDEX.DAT

The 2**3 design can be read by entering:

        SKIP 25
        READ 2TO3.DAT X1 X2 X3

The above file names can vary (e.g., lower case or a different extension) on some operating systems. If you cannot locate these files, check with your local site installer.

DEFAULT
None

SYNONYMS
None

RELATED COMMANDS

      YATES ANALYS   =   Analyze a Yates design.

APPLICATION

      Yates design matrices

IMPLEMENTATION DATE

      90/12

PROGRAM

```
LET X = SEQUENCE 1 1 8
LET X1 = BINPAT(X,1)
LET X2 = BINPAT(X,2)
LET X3 = BINPAT(X,3)
SET WRITE DECIMALS 0
PRINT X1 X2 X3
```

      The following output is generated.

```
VARIABLES--X1          X2          X3

        -1          -1          -1
         1          -1          -1
        -1           1          -1
         1           1          -1
        -1          -1           1
         1          -1           1
        -1           1           1
         1           1           1
```