NAG C Library Function Document

nag_pack_real_mat_print_comp (x04cdc)

1 Purpose

nag_pack_real_mat_print_comp (x04cdc) prints a real triangular matrix stored in a packed one-dimensional array.

2 Specification

```
void nag_pack_real_mat_print_comp (Nag_OrderType order, Nag_UploType uplo,
     Nag_DiagType diag, Integer n, const double a[], const char *format,
     const char *title, Nag_LabelType labrow, const char *rlabs[],
     Nag_LabelType labcol, const char *clabs[], Integer ncols, Integer indent,
     const char *outfile, NagError *fail)
```

3 Description

nag_pack_real_mat_print_comp (x04cdc) prints a real triangular matrix stored in packed form, using a format specifier supplied by the user. The matrix is output to the file specified by **outfile** or, by default, to standard output.

4 References

None.

5 Parameters

1: **order** – Nag_OrderType *Input*

On entry: the **order** parameter specifies the two-dimensional storage scheme being used, i.e., row-major ordering or column-major ordering. C language defined storage is specified by **order** = **Nag_RowMajor**. See Section 2.2.1.4 of the Essential Introduction for a more detailed explanation of the use of this parameter.

Constraint: **order** = **Nag_RowMajor** or **Nag_ColMajor**.

2: **uplo** – Nag_UploType *Input*

On entry: indicates the type of the matrix to be printed, as follows:

if **uplo** = **Nag_Lower**, the matrix is lower triangular;

if **uplo** = **Nag_Upper**, the matrix is upper triangular.

Constraint: **uplo** = **Nag_Lower** or **Nag_Upper**.

3: **diag** – Nag_DiagType *Input*

On entry: indicates whether the diagonal elements of the matrix are to be printed, as follows:

if **diag** = **Nag_NonRefDiag**, the diagonal elements of the matrix are not referenced and not printed;

if **diag** = **Nag_UnitDiag**, the diagonal elements of the matrix are not referenced, but are assumed all to be unity, and are printed as such;

if **diag** = **Nag_NonUnitDiag**, the diagonal elements of the matrix are referenced and printed.

Constraint: **diag** = **Nag_NonRefDiag**, **Nag_UnitDiag** or **Nag_NonUnitDiag**.

4: **n** – Integer *Input*

On entry: the order of the matrix to be printed.

If **n** is less than 1, nag_pack_real_mat_print_comp (x04cdc) will exit immediately after printing **title**; no row or column labels are printed.

5: **a**[dim] – const double *Input*

Note: the dimension, dim, of the array **a** must be at least $\max(1, \mathbf{n} \times (\mathbf{n}+1)/2)$.

On entry: the matrix to be printed. The storage of elements a_{ij} depends on the **order** and **uplo** parameters as follows:

if **order** = **Nag_ColMajor** and **uplo** = **Nag_Upper**,
a_{ij} is stored in **a**[$(j-1) \times j/2 + i - 1$], for $i \leq j$;

if **order** = **Nag_ColMajor** and **uplo** = **Nag_Lower**,
a_{ij} is stored in **a**[$(2n-j) \times (j-1)/2 + i - 1$], for $i \geq j$;

if **order** = **Nag_RowMajor** and **uplo** = **Nag_Upper**,
a_{ij} is stored in **a**[$(2n-i) \times (i-1)/2 + j - 1$], for $i \leq j$;

if **order** = **Nag_RowMajor** and **uplo** = **Nag_Lower**,
a_{ij} is stored in **a**[$(i-1) \times i/2 + j - 1$], for $i \geq j$.

Note that **a** must have space for the diagonal elements of the matrix, even if these are not stored.

6: **format** – char * *Input*

On entry: a valid C format code. This should be of the form $\%[flag]ww.pp[format\ indicator]$, where $ww.pp$ indicates that up to 2 digits may be used to specify the field width and precision respectively. Only % and $format\ indicator$ must be present. $flag$ can be one of $-$, $+$, $< space >$ or # and $format\ indicator$ can be e, E, f, g or G. Thus, possible formats include %f, %+23.15G, %.6e. **format** is used to print elements of the matrix A.

In addition, nag_pack_real_mat_print_comp (x04cdc) chooses its own format code when **format** is **NULL** or **format** = $*$.

If **format** = **NULL**, nag_pack_real_mat_print_comp (x04cdc) will choose a format code such that numbers will be printed with either a %8.4f, a %11.4f or a %13.4e format. The %8.4f code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 1.0. The %11.4f code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 9999.9999. Otherwise the %13.4e code is chosen.

If **format** = $*$, nag_pack_real_mat_print_comp (x04cdc) will choose a format code such that numbers will be printed to as many significant digits as are necessary to distinguish between neighbouring machine numbers. Thus any two numbers that are stored with different internal representations should look different on output.

Constraint: **format** must be of the form $\%[flag]ww.pp[format\ indicator]$.

7: **title** – char * *Input*

On entry: a title to be printed above the matrix. If **title** = **NULL**, no title (and no blank line) will be printed.

If **title** contains more than **ncols** characters, the contents of **title** will be wrapped onto more than one line, with the break after **ncols** characters.

Any trailing blank characters in **title** are ignored.

8: **labrow** – Nag_LabelType *Input*

On entry: indicates the type of labelling to be applied to the rows of the matrix, as follows:

if **labrow** = **Nag_NoLabels**, nag_pack_real_mat_print_comp (x04cdc) prints no row labels;

if **labrow** = **Nag_IntegerLabels**, nag_pack_real_mat_print_comp (x04cdc) prints integer row labels;

if **labrow** = **Nag_CharacterLabels**, nag_pack_real_mat_print_comp (x04cdc) prints character labels, which must be supplied in array **rlabs**.

Constraint: **labrow** = **Nag_NoLabels**, **Nag_IntegerLabels** or **Nag_CharacterLabels**.

9: **rlabs**[dim] – const char * *Input*

On entry: if **labrow** = **Nag_CharacterLabels**, **rlabs** must be dimensioned at least of length **n** and must contain labels for the rows of the matrix, otherwise **rlabs** should be **NULL**.

Labels are right justified when output, in a field which is as wide as necessary to hold the longest row label. Note that this field width is subtracted from the number of usable columns, **ncols**.

10: **labcol** – Nag_LabelType *Input*

On entry: indicates the type of labelling to be applied to the columns of the matrix, as follows:

if **labcol** = **Nag_NoLabels**, nag_pack_real_mat_print_comp (x04cdc) prints no column labels;

if **labcol** = **Nag_IntegerLabels**, nag_pack_real_mat_print_comp (x04cdc) prints integer column labels;

if **labcol** = **Nag_CharacterLabels**, nag_pack_real_mat_print_comp (x04cdc) prints character labels, which must be supplied in array **clabs**.

Constraint: **labcol** = **Nag_NoLabels**, **Nag_IntegerLabels** or **Nag_CharacterLabels**.

11: **clabs**[dim] – const char * *Input*

On entry: if **labcol** = **Nag_CharacterLabels**, **clabs** must be dimensioned at least of length **n** and must contain labels for the columns of the matrix, otherwise **clabs** should be **NULL**.

Labels are right-justified when output. Any label that is too long for the column width, which is determined by **format**, is truncated.

12: **ncols** – Integer *Input*

On entry: the maximum output record length. If the number of columns of the matrix is too large to be accommodated in **ncols** characters, the matrix will be printed in parts, containing the largest possible number of matrix columns, and each part separated by a blank line.

ncols must be large enough to hold at least one column of the matrix using the format specifier in **format**. If a value less than or equal to 0 or greater than 132 is supplied for **ncols**, then the value 80 is used instead.

13: **indent** – Integer *Input*

On entry: the number of columns by which the matrix (and any title and labels) should be indented. The effective value of **ncols** is reduced by **indent** columns. If a value less than 0 or greater than **ncols** is supplied for **indent**, the value 0 is used instead.

14: **outfile** – char * *Input*

On entry: the name of a file to which output will be directed. If **outfile** is **NULL** the output will be directed to standard output.

15: **fail** – NagError * *Input/Output*

The NAG error parameter (see the Essential Introduction).

6 Error Indicators and Warnings

NE_COL_WIDTH

⟨*value*⟩ is not wide enough to hold at least one matrix column. **ncols** = ⟨*value*⟩, **indent** = ⟨*value*⟩.

NE_INVALID_FORMAT

The string ⟨*value*⟩, has not been recognised as a valid format.

NE_ALLOC_FAIL

Memory allocation failed.

NE_BAD_PARAM

On entry, parameter ⟨*value*⟩ had an illegal value.

NE_NOT_WRITE_FILE

Cannot open file ⟨*value*⟩ for writing.

NE_NOT_APPEND_FILE

Cannot open file ⟨*value*⟩ for appending.

NE_NOT_CLOSE_FILE

Cannot close file ⟨*value*⟩.

NE_INTERNAL_ERROR

An internal error has occurred in this function. Check the function call and any array sizes. If the call is correct then please consult NAG for assistance.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.