

D.1 EXPANDED DEFINITION OF STDS FACILITIES

#R SS81:STDS\*

#EXECUTION BEGINS

\*\* SET-THEORETIC DATA STRUCTURE: INTERACTIVE DEMONSTRATION \*\*  
(12/6/69)

FOR AN EXPLANATION ENTER "1": 1

CONVENTIONS:

C(A) = CARDINALITY OF A  
L(A) = LENGTH OF LONGEST N-TUPLE IN A  
U(A) = LARGEST DATUM NAME (INTEGER) IN A  
ALL ARGUMENTS MUST BE FROM 1 TO 4 CHARACTERS

SET OPERATIONS AVAILABLE:

UN(A,B,C)	IN(A,B,C)	SD(A,B,C)	RL(A,B,C)
CV(A,C)	DM(I,A,C)	IM(I,A,B,C)	RS(I,A,B,C)
NF(A,C)	RD(A,B,C)	CARD(A)	XREL(A,B,C)
XPAN(I,A,B,C)	IGTJ(A,I,J,C)	IEQJ(A,I,J,C)	

NON-SET OPERATIONS AVAILABLE:

SETH	LIST	FREE	MIN	INDX	SET
GET	PUT	MTS	DATA	XSUB	

\*\* QUID(A...Z) GIVES EXPLANATIONS OF OPERATIONS A THROUGH Z.

\*\* ATTENTION INTERRUPTS ARE FIELDDED BY STDS\*.

?QUID(UN,IN,SD,RL,CV)

####

#

# UN(A,B,C)

#

# C = A UNION B

# C IS THE SET OF ELEMENTS THAT ARE EITHER IN  
# SET A OR SET B.

#

####

####

#

# IN(A,B,C)

#

# C = A INTERSECTION B

# C IS THE SET OF ELEMENTS COMMON TO BOTH SET A AND SET B.

#

####

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####
#
#   SD(A,B,C)
#
#   C = SYMMETRIC DIFFERENCE OF A AND B
#   C IS THE SET OF ELEMENTS THAT ARE EITHER IN SET A OR IN S
#   BUT NOT IN BOTH.
#
####

####
#
#   RL(A,B,C)
#
#   C = RELATIVE COMPLEMENT OF A WITH B
#   C IS THE SET OF ELEMENTS IN SET A THAT ARE NOT ALSO IN
#   SET B.
#
####

####
#
#   CV(A,C)
#
#   C = CONVERSE OF A
#   C CONTAINS "REVERSED" N-TUPLES OF SET A.
#   IF <W,X,Y,Z> IS IN A, THEN <Z,Y,X,W> IS IN C.
#
####

?QUID(DM,IM,RS,NF)

####
#
#   DM(I,A,C)
#
#   C = I-TH DOMAIN OF A
#
#   C IS THE SET OF ELEMENTS THAT APPEAR IN THE I-TH
#   POSITION OF N-TUPLES IN SET A.
#
####

####
#
#   IM(I,A,B,C)
#
#   C = I-TH IMAGE OF B UNDER A
#
#   C IS THE SET OF ELEMENTS THAT APPEAR IN THE I+1
#   POSITION OF N-TUPLES IN SET A, ONLY IF THE CORRESPONDING
#   FIRST ELEMENT IN THE N-TUPLE IS CONTAINED IN SET B.
#
####

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```

####
#
#   XREL(A,B,C)
#
#   C = RELATION EXTRACTED FROM A BY B
#
#   A IS A SET OF N-TUPLES, B IS AN INDX SET.
#   C IS THE SET OF N-TUPLES WITH L(C)=C(B) and WITH C(C)
#       EQUAL TO OR LESS THAN C(A), SUCH THAT IF <I,J> IS
#       AN ELEMENT OF B THEN THE I-TH ELEMENTS IN N-TUPLES
#       OF C WERE J-TH ELEMENTS IN N-TUPLES OF A.
#
####

```

?QUID(XPAN, IGTJ, IEQJ)

```

####
#
#   XPAN(I,A,B,C)      XPAN(I,A,B,C,V)
#
#   C =A EXPANDED BY B.
#
#   C IS THE SET OF N-TUPLES SUCH THAT:
#       <X(1),...,X(I),A(I+1),...,A(N),B(I+1),...,B(M)> IS IN C
#       IFF  N = L(A),  M = L(B),
#       <X(1),...,X(I),A(I+1),...,A(N)> IS IN A, AND
#       <X(1),...,X(I),B(I+1),...,B(M)> IS IN B.
#
####

```

```

####
#
#   IGTJ(A,I,J,C)
#
#   C IS THE SET OF N-TUPLES FROM A HAVING AN I-TH POSITION
#       LOGICALLY GREATER THAN THE J-TH POSITION.
#
####

```

```

####
#
#   IEQJ(A,I,J,C)
#
#   C IS THE SET OF N-TUPLES FROM A HAVING IDENTICAL I-TH
#       AND J-TH POSITIONS.
#
####

```

?QUID (SETH, LIST, FREE, MIN)

####

#

#     SETH(A)             SETH(A,U(A),L(A),C(A))             SETH(A,B,L(A),C(A))

#

#

#     A IS THE SET TO BE FORMED.

#

#     B IS AN INDEX SET SPECIFYING THE LARGEST DATUM NAME

#

#         (AN INTEGER) FOR EACH POSITION OF THE N-TUPLES OF

#

#     U(A),L(A),C(A) ARE RESPECTIVELY THE LARGEST DATUM NAME,

#

#         THE LENGTH OF THE LONGEST N-TUPLE, AND CARDINALITY

#

#         OF A.

#

#     WHEN A IS THE ONLY ARGUMENT, THE ELEMENTS ARE TO BE

#

#         ENTERED INDIVIDUALLY USING A (XIY) FORMAT, WHERE X

#

#         AND Y ARE INTEGERS. IF DATA IS IN A FILE USE:

#

#         DATA(A).

#

####

####

#

#     LIST             LIST(A)             LIST(A,I,J)             LIST(A,I,J,V)

#

#

#     A IS THE SET TO BE LISTED.

#

#     I AND J ARE INTEGERS INDICATING THAT THE I-TH THROUGH THE

#

#         J-TH ELEMENTS OF A ARE TO BE LISTED.

#

#     WHEN NO ARGUMENTS ARE PRESENT, THE CLASS OF AVAILABLE SETS

#

#         WILL BE LISTED.

#

#     V=1 ALLOWS FOR VARIABLE PRINT FORMATS.

#

#     V=-1 ALLOWS SETTING PERMANENT PRINT FORMATS.

#

####

####

#

#     FREE(A,...,Z)

#

#

#     A,...,Z ARE SETS WHICH ARE TO BE DESTROYED.

#

####

####

#

#     MIN(A,...,Z)             MIN

#

#

#     A,...,Z ARE SETS WHOSE STORAGE ALLOCATION IS TO BE

#

#         MINIMIZED.

#

#     WHEN NO ARGUMENTS ARE PRESENT, ALL SETS WILL BE MINIMIZED.

#

####

?QUID (INDX, SET, GET, PUT, MTS, DATA)

####

#

# INDX(A) INDX(A,X(1),...X(C(A)))

#

# A IS TO BE A SET OF ORDERED PAIRS, WHOSE DOMAIN ELEMENTS  
# ARE 1 THROUGH C(A), AND WHOSE RANGE ELEMENTS ARE TO  
# BE LISTED INDIVIDUALLY.

#

# C(A) IS THE CARDINALITY OF SET A.  
# WHENEVER A ZERO IS ENTERED AS A RANGE ELEMENT, THE  
# REMAINDER OF THE SET WILL BE GENERATED RANDOMLY  
# BETWEEN 1 AND U(A).

#

# X(1),...X(C(A)) ARE RANGE ELEMENTS.

#

####

####

#

# SET(A,B,...,Z)

#

# A IS THE SET TO BE FORMED.  
# B,...,Z ARE INTEGER ELEMENTS OF THE SET A.

#

####

####

#

# GET(A)

#

# THE SPECIFIED FILE IS PUT INTO A.

#

####

####

#

# PUT(A)

#

# A IS PUT INTO THE SPECIFIED FILE.

#

####

####

#

# MTS IS CALLED.  
# RETURN TO STDS\* BY ENTERING "\$RES".

#

####

?QUID(DATA,XSUB)

####

#

# DATA(A,L(A),C(A)) DATA(A,L(A),C(A),V)

#

# THIS COMMAND ALLOWS READING DATA FROM FILES.

# V=1,...,10 PICKS A PRESET INPUT FORMAT.

# V=-1,...,-10 ALLOWS SETTING INPUT FORMATS.

#

####

####

#

# XSUB(A,C) XSUB(A,I,J,C)

#

# C IS A SUBSET OF CONSECUTIVE ELEMENTS OF A.

# WHEN I AND J ARE GIVEN, C CONTAINS THE I-TH THROUGH

# THE J-TH ELEMENTS OF A, OTHERWISE TWO ELEMENTS

# ARE ENTERED AND C CONTAINS ALL ELEMENTS IN A

#

#

####