

Date: 26 August 1999 L2/99-244

To: Unicode Technical Committee
ISO/IEC JTC1/SC2/WG2

From: STIX Project of the STIPUB Consortium (a consortium of scientific societies and scientific/technical publishers)

Subject: Request for assignment of codes to mathematical and technical symbols that do not appear in Unicode 2.0 or ISO/IEC 10646 (supersedes L2/99-159)

References: L2/98-405, Request for assignment of codes to mathematical and technical symbols that do not appear in Unicode 2.0 or ISO/IEC 10646
L2/98-406, Proposal to encode mathematical variant tags
L2/99-045, Proposal to encode mathematical alphanumeric symbols
L2/99-049, Addendum to L2/98-405: Request for assignment of codes to mathematical and technical symbols
L2/99-159, Request for assignment of codes to mathematical and technical symbols that do not appear in Unicode 2.0 or ISO/IEC 10646 (revised)
L2/99-160, Proposal to encode mathematical variant tags
L2/99-195, Proposal to encode mathematical alphanumeric symbols
L2/99-199, Mathematical Alphabets (for L2/99-195)

This document is a complete revision of the similarly titled version of 1 June 1999 (L2/99-159). It reinstates material authorized by decisions of the June UTC meeting, and as well incorporates new material from (1) the Proposal to add the ISO Standard Z character set to Unicode/ISO-IEC 10646, transmitted by the UTC chair, and (2) an additional source that had been intended for inclusion in the original proposal but was missed owing to miscommunication among some STIX participants.

Rationale

Scientific communication and publication via the Web are currently hindered by the absence of both suitable symbol fonts and recognized methods of indicating particular symbols and their relationships to one another. The font problems of ordinary text, which are considerable irrespective of language, have so far been addressed essentially only by the introduction of the ISO 10646/Unicode standard. The special problems of handling technical texts have been examined by the W3C Math Working Group, and their MathML proposal, which is interdependent with this request, was accepted as a W3C Recommendation on 7 April 1998 [see <http://www.w3c.org/Math>]. The work of the HTML-Math WG is also related to the work of the OpenMath consortium.

The present proposal is the work of the STIX Project (scientific and technical information exchange), a working group reporting to STIPUB, a consortium of publishers of mathematical, scientific, and technical books and journals. The ultimate product of the STIX group will be the creation of one comprehensive set of fonts for scientific and technical publishing. This set

of fonts should be adopted and supported by all major STM publishers, and will also be made available for general use under license but free of charge, with the explicit aim to ease and foster the uninhibited flow, exchange, and linking of scientific information. The symbol complement of the STIX font set will be based on the symbols in this proposal along with many already in Unicode, as well as variant forms not included here (because they are required by publishing house styles without different meaning from symbols included above) and additional technical symbols from areas other than mathematics.

The availability of a universal font set will benefit scientific and technical publishing in several ways:

- It will eliminate certain legal problems with distributing PDF files and publishing on the World Wide Web.
- It will ease the exchange of documents from different publishers.
- It will make the re-use of archived material simpler and more robust.

The STIX group has agreed that the basis for the organization of such a font set should be ISO 10646/Unicode. Some arguments in favor of ISO 10646/Unicode are: it is the basis for XML, and therefore for MathML, and it is the character set of the programming language Java and the operating system Windows NT. In XML documents, and most importantly for use in MathML, one must be able to identify all notation, either by numerical character reference or by entity reference. But numerical character references are ISO 10646/Unicode numbers, since that is the character set underlying XML. If entity names are used, they must still be mapped to something that applications will be able to handle and render.

In the attached charts and lists, we have included only what we believe to be unique symbols. The language of mathematics is fluid, and symbols are defined in context to represent particular mathematical concepts. The tool set of an active mathematician ideally consists of several alphabets, whose members can be distinguished from one another, to represent various classes of variables and constants, and a fairly extensive collection of similarly sized shapes to represent various operations. There are of course many fully “standardized” shapes that are now used almost exclusively to represent particular operations and relations, but even these are sometimes adopted in fields where they are not already in use and redefined to have some other particular meaning. For this reason, the “definitions” accompanying the symbols listed here are in some cases not precise; where multiple varying meanings are possible, or a single precise meaning is not available, the shape is described.

The case for alphabets

For a mathematician or other scientist, alphabets provide the symbols to represent ad hoc variables as well as a number of more well-defined concepts. Different styles of alphabets have different meanings, some of which have been formally standardized in some disciplines, but many of which follow only the strength of custom, or even current necessity.

Document L2/99-195, Proposal to encode mathematical alphanumeric symbols, catalogues the different styles of alphabets that are routinely used in mathematical and technical literature; these alphabets and digits will not be further dealt with here.

There remain, however, some individual letters from or related to these alphabets that are routinely used in a turned or inverted orientation, as well as a few symbols in the style of a particular math alphabet but not part of its normal alphabetic complement. These are considered distinct symbols, and are therefore candidates for code assignments.

Symbols

In the tables that follow, four data elements are given for each symbol:

- a reference ID indicating location in the corresponding chart
- a * if there is an existing symbol in Unicode or another symbol in this collection that appears to be similar
- a one-letter code indicating the class of the symbol:
 - N: normal or ordinary, e.g., symbol used as a variable
 - A: alphabetic; subclass of ordinary
 - D: diacritic or combining symbol
 - P: punctuation
 - B: binary operator, e.g., $a + b$
 - R: relation, e.g., $a = b$
 - L: large operator, e.g. sum, product
 - O: opening delimiter (assuming left-to-right presentation)
 - C: closing delimiter (assuming left-to-right presentation)
 - F: nondirectional delimiter (fence post)
- description of the symbol, or meaning when dominant

Letter-like symbols

AX00 N GREEK SYMBOL CAPITAL THETA WITH STRAIGHT BAR
 → 0472 cyrillic capital letter fita
 → 04E8 cyrillic capital letter barred o

AX01 N GREEK SYMBOL CURLY CAPITAL UPSILON

AX02 N GREEK SYMBOL STRAIGHT EPSILON

AX03 N GREEK SYMBOL REVERSED STRAIGHT EPSILON

AX04 N GREEK LETTER Q-KOPPA

AX05 N GREEK SMALL LETTER Q-KOPPA

AX06 N TURNED SANS SERIF CAPITAL G
 = game

AX07 N TURNED SANS SERIF CAPITAL L

AX08 N REVERSED SANS SERIF CAPITAL L

AX09 N INVERTED SANS SERIF CAPITAL Y

AX0A N OPEN-FACE GREEK SMALL LETTER GAMMA

AX0B N OPEN-FACE GREEK CAPITAL GAMMA

AX0C N OPEN-FACE GREEK CAPITAL PI

AX0D L OPEN-FACE SUM

Combining diacritical marks

AXOE D COMBINING REVERSED SOLIDUS OVERLAY
AXOF D COMBINING DOUBLE VERTICAL STROKE OVERLAY
= Z NOTATION FINITE FUNCTION
AX10 D ANNUITY SYMBOL - ACTUARIAL BEND
[removed: AX11 - AX15]
AX16 D TRIPLE UNDERDOT
[removed: AX17 - AX1A]

Punctuation

AX1B LOW ASTERISK
AX1C N QUADRUPLE PRIME
[composed: U+2032 + U+2032 + U+2032 + U+2032]
AX1D [removed: 2010]
AX1E REVERSED SEMI-COLON
AX1F P EM LEADER
AX20 N TWO ASTERISKS ALIGNED VERTICALLY
AX21 SOLIDUS OVERBAR
[composed: U+002F + U+0304]
AX22 REVERSED SOLIDUS WITH HORIZONTAL STROKE
[composed: U+005C + U+0336]
AX23 B BIG SOLIDUS
AX24 B BIG REVERSED SOLIDUS
= Z NOTATION SCHEMA HIDING
. visually distinguishably bigger than set minus
AX25 TOP SQUARE BRACKET
AX26 BOTTOM SQUARE BRACKET
AX27 BOTTOM ABOVE TOP SQUARE BRACKET
AX28 N TURNED AMPERSAND
AX29 EXTENSIBLE HORIZONTAL LINE
AX2A N MEDIUM MATH SPACE
. four-eighteenths of an em
AX2B [removed: 2423]

	AX0	AX1	AX2
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
A			
B			
C			
D			
E			
F			

	BX0	BX1	BX2	BX3	BX4	BX5	BX6	BX7	BX8
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
A									
B									
C									
D									
E									
F									

Arrows and harpoons, combinations, fishtails

- BX00 R DOWNWARDS ARROW LEFTWARDS OF UPWARDS ARROW
- BX01 R THREE RIGHTWARDS ARROWS
- BX02 R LEFTWARDS ARROW WITH VERTICAL STROKE
- BX03 R RIGHTWARDS ARROW WITH VERTICAL STROKE
= Z NOTATION PARTIAL FUNCTION
- BX04 R LEFT RIGHT ARROW WITH VERTICAL STROKE
= Z NOTATION PARTIAL RELATION
- BX05 R LEFTWARDS ARROW WITH DOUBLE VERTICAL STROKE
- BX06 R RIGHTWARDS ARROW WITH DOUBLE VERTICAL STROKE
= Z NOTATION FINITE FUNCTION

BX07 R LEFT RIGHT ARROW WITH DOUBLE VERTICAL STROKE
 = Z NOTATION FINITE RELATION
 BX08 RULE-DELAYED
 = colon right arrow
 BX09 R LEFTWARDS OPEN-HEADED ARROW
 BX0A R RIGHTWARDS OPEN-HEADED ARROW
 BX0B R LEFT RIGHT OPEN-HEADED ARROW
 BX0C R RIGHTWARDS TWO-HEADED ARROW WITH VERTICAL STROKE
 = Z NOTATION PARTIAL SURJECTION
 BX0D R RIGHTWARDS TWO-HEADED ARROW WITH DOUBLE VERTICAL STROKE
 = Z NOTATION FINITE SURJECTION
 BX0E R LEFTWARDS DOUBLE ARROW WITH VERTICAL STROKE
 BX0F R RIGHTWARDS DOUBLE ARROW WITH VERTICAL STROKE
 BX10 R LEFT RIGHT DOUBLE ARROW WITH VERTICAL STROKE
 BX11 R RIGHTWARDS TWO-HEADED ARROW FROM BAR
 = maps to
 BX12 R LEFTWARDS DOUBLE ARROW FROM BAR
 = maps from
 BX13 R RIGHTWARDS DOUBLE ARROW FROM BAR
 = maps to
 BX14 R DOWNWARDS ARROW WITH HORIZONTAL STROKE
 BX15 R UPWARDS ARROW WITH HORIZONTAL STROKE
 BX16 R UPWARDS TRIPLE ARROW
 BX17 R DOWNWARDS TRIPLE ARROW
 BX18 R LEFTWARDS BROKEN ARROW
 BX19 R RIGHTWARDS BROKEN ARROW
 BX1A R LEFTWARDS DOUBLY BROKEN ARROW
 BX1B R RIGHTWARDS DOUBLY BROKEN ARROW
 BX1C R RIGHTWARDS TWO-HEADED BROKEN ARROW
 BX1D R RIGHTWARDS ARROW WITH DOTTED STEM
 BX1E R UPWARDS ARROW TO BAR
 BX1F R DOWNWARDS ARROW TO BAR
 BX20 R RIGHTWARDS ARROW WITH TAIL WITH VERTICAL STROKE
 = Z NOTATION PARTIAL INJECTION
 BX21 R RIGHTWARDS ARROW WITH TAIL WITH DOUBLE VERTICAL STROKE
 = Z NOTATION FINITE INJECTION
 BX22 R RIGHTWARDS TWO-HEADED ARROW WITH TAIL
 = bijective mapping
 = Z NOTATION BIJECTION
 BX23 R RIGHTWARDS TWO-HEADED ARROW WITH TAIL WITH VERTICAL STROKE
 = Z NOTATION SURJECTIVE INJECTION
 BX24 R RIGHTWARDS TWO-HEADED ARROW WITH TAIL WITH DOUBLE VERTICAL STROKE
 = Z NOTATION FINITE SURJECTIVE INJECTION
 BX25 R LEFTWARDS ARROW-TAIL
 BX26 R RIGHTWARDS ARROW-TAIL
 BX27 R LEFTWARDS DOUBLE ARROW-TAIL
 BX28 R RIGHTWARDS DOUBLE ARROW-TAIL
 BX29 R LEFTWARDS ARROW TO FILLED SQUARE
 BX2A R RIGHTWARDS ARROW TO FILLED SQUARE
 BX2B R LEFTWARDS ARROW FROM BAR TO FILLED SQUARE
 BX2C R RIGHTWARDS ARROW FROM BAR TO FILLED SQUARE
 BX2D R NORTH WEST-SOUTH EAST ARROW
 BX2E R NORTH EAST-SOUTH WEST ARROW
 BX2F R NORTH WEST ARROW WITH HOOK

BX30 R NORTH EAST ARROW WITH HOOK
 BX31 R SOUTH EAST ARROW WITH HOOK
 BX32 R SOUTH WEST ARROW WITH HOOK
 BX33 R NORTH WEST AND NORTH EAST ARROWS
 BX34 R NORTH EAST AND SOUTH EAST ARROWS
 BX35 R SOUTH EAST AND SOUTH WEST ARROWS
 BX36 R SOUTH WEST AND NORTH WEST ARROWS
 BX37 N RISING DIAGONAL CROSSING FALLING DIAGONAL
 BX38 N FALLING DIAGONAL CROSSING RISING DIAGONAL
 BX39 N SOUTH EAST ARROW CROSSING NORTH EAST ARROW
 BX3A N NORTH EAST ARROW CROSSING SOUTH EAST ARROW
 BX3B N FALLING DIAGONAL CROSSING NORTH EAST ARROW
 BX3C N RISING DIAGONAL CROSSING SOUTH EAST ARROW
 BX3D N NORTH EAST ARROW CROSSING NORTH WEST ARROW
 BX3E N NORTH WEST ARROW CROSSING NORTH EAST ARROW
 BX3F * R RIGHTWARDS ARROW-CURVED
 BX40 R NOT RIGHTWARDS ARROW-CURVED
 [composed: BX3F + U+0338]
 BX41 R NOT RIGHTWARDS ARROW-WAVY
 [composed: U+219D + U+0338]
 BX42 * R ARROW POINTING DOWNWARDS THEN CURVING LEFTWARDS
 BX43 * R ARROW POINTING DOWNWARDS THEN CURVING RIGHTWARDS
 BX44 R RIGHT-SIDE ARC CLOCKWISE ARROW
 BX45 R LEFT-SIDE ARC ANTICLOCKWISE ARROW
 BX46 R TOP ARC ANTICLOCKWISE ARROW
 BX47 R BOTTOM ARC ANTICLOCKWISE ARROW
 BX48 R TOP ARC CLOCKWISE ARROW WITH MINUS
 BX49 R TOP ARC ANTICLOCKWISE ARROW WITH PLUS
 BX4A R LOWER LEFT SEMICIRCULAR CLOCKWISE ARROW
 BX4B R LOWER RIGHT SEMICIRCULAR ANTICLOCKWISE ARROW
 BX4C * R ANTICLOCKWISE CLOSED CIRCLE ARROW
 BX4D * R CLOCKWISE CLOSED CIRCLE ARROW
 BX4E R LEFTWARDS ARROW ABOVE SHORT RIGHTWARDS ARROW
 BX4F R RIGHTWARDS ARROW ABOVE SHORT LEFTWARDS ARROW
 BX50 R SHORT RIGHTWARDS ARROW ABOVE LEFTWARDS ARROW
 BX51 R RIGHTWARDS ARROW WITH PLUS BELOW
 BX52 R LEFTWARDS ARROW WITH PLUS BELOW
 BX53 R RIGHTWARDS ARROW THROUGH X
 BX54 R SMALL CIRCLE WITH SUPERIMPOSED LEFT RIGHT ARROW
 BX55 R UPWARDS TWO-HEADED ARROW FROM SMALL CIRCLE
 BX56 R RIGHT ANGLE WITH DOWNWARDS ZIG-ZAG ARROW
 BX57 R LEFT-UP-RIGHT-DOWN HARPOON
 BX58 R LEFT-DOWN-RIGHT-UP HARPOON
 BX59 R UP-RIGHT-DOWN-LEFT HARPOON
 BX5A R UP-LEFT-DOWN-RIGHT HARPOON
 BX5B R LEFT-UP-RIGHT-UP HARPOON
 BX5C R UP-RIGHT-DOWN-RIGHT HARPOON
 BX5D R LEFT-DOWN-RIGHT-DOWN HARPOON
 BX5E R UP-LEFT-DOWN-LEFT HARPOON
 BX5F R LEFTWARDS HARPOON-UP TO BAR
 BX60 R RIGHTWARDS HARPOON-UP TO BAR
 BX61 R UPWARDS HARPOON-RIGHT TO BAR
 BX62 R DOWNWARDS HARPOON-RIGHT TO BAR
 BX63 R LEFTWARDS HARPOON DOWN TO BAR

BX64 R RIGHTWARDS HARPOON DOWN TO BAR
 BX65 R UPWARDS HARPOON-LEFT TO BAR
 BX66 R DOWNWARDS HARPOON-LEFT TO BAR
 BX67 R LEFTWARDS HARPOON-UP FROM BAR
 BX68 R RIGHTWARDS HARPOON-UP FROM BAR
 BX69 R UPWARDS HARPOON-RIGHT FROM BAR
 BX6A R DOWNWARDS HARPOON-RIGHT FROM BAR
 BX6B R LEFTWARDS HARPOON-DOWN FROM BAR
 BX6C R RIGHTWARDS HARPOON-DOWN FROM BAR
 BX6D R UPWARDS HARPOON-LEFT FROM BAR
 BX6E R DOWNWARDS HARPOON-LEFT FROM BAR
 BX6F R LEFTWARDS HARPOON-UP OVER LEFTWARDS HARPOON-DOWN
 BX70 R UPWARDS HARPOON-LEFT BESIDE UPWARDS HARPOON-RIGHT
 BX71 R RIGHTWARDS HARPOON-UP OVER RIGHTWARDS HARPOON-DOWN
 BX72 R DOWNWARDS HARPOON-LEFT BESIDE DOWNWARDS HARPOON-RIGHT
 BX73 R LEFTWARDS HARPOON-UP OVER RIGHTWARDS HARPOON-UP
 BX74 R LEFTWARDS HARPOON-DOWN OVER RIGHTWARDS HARPOON-DOWN
 BX75 R RIGHTWARDS HARPOON-UP OVER LEFTWARDS HARPOON-UP
 BX76 R RIGHTWARDS HARPOON-DOWN OVER LEFTWARDS HARPOON-DOWN
 BX77 R LEFTWARDS HARPOON-UP OVER LONG DASH
 BX78 R LEFTWARDS HARPOON-DOWN BELOW LONG DASH
 BX79 R RIGHTWARDS HARPOON-UP OVER LONG DASH
 BX7A R RIGHTWARDS HARPOON-DOWN BELOW LONG DASH
 BX7B R UPWARDS HARPOON-LEFT BESIDE DOWNWARDS HARPOON-RIGHT
 BX7C R DOWNWARDS HARPOON-LEFT BESIDE UPWARDS HARPOON-RIGHT
 BX7D R RIGHT DOUBLE ARROW WITH ROUNDED HEAD
 . looks like thin superset

Combinations with arrows

BX7E R EQUAL ABOVE RIGHTWARDS ARROW
 BX7F R SIMILAR ABOVE RIGHTWARDS ARROW
 BX80 R LEFTWARDS ARROW ABOVE TILDE OPERATOR
 BX81 R RIGHTWARDS ARROW ABOVE TILDE OPERATOR
 BX82 R RIGHTWARDS ARROW ABOVE DOUBLE TILDE OPERATOR
 BX83 R LESS THAN ABOVE LEFTWARDS ARROW
 BX84 R LEFTWARDS ARROW THROUGH LESS-THAN
 BX85 R GREATER-THAN ABOVE RIGHTWARDS ARROW
 BX86 R SUBSET ABOVE RIGHTWARDS ARROW
 BX87 R LEFTWARDS ARROW THROUGH SUBSET
 BX88 R SUPERSET ABOVE LEFTWARDS ARROW

Fish tails

BX89 * R LEFT FISH TAIL
 BX8A * R RIGHT FISH TAIL
 BX8B R UP FISH TAIL
 BX8C R DOWN FISH TAIL

	CX0	CX1	CX2	CX3	CX4	CX5	CX6	CX7	CX8	CX9	CXA	CXB	CXC	CXD	CXE	CXF
0	€	⊖	∩	ƒ	✦	⊗	∩	∩	△	≠	≡	∩	≠	∩	≠	∩
1	⊖	∩	∩	ƒ	∩	⊗	∩	∩	△	≠	≡	∩	≠	∩	≠	∩
2	⊖	∩	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
3	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
4	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
5	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
6	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
7	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
8	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
9	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
A	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
B	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
C	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
D	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
E	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩
F	€	⊖	∩	ƒ	∩	⊗	∩	∩	△	∩	≡	∩	≠	∩	≠	∩

Membership

- CX00 R ELEMENT OF WITH LONG HORIZONTAL STROKE
- CX01 R ELEMENT OF WITH VERTICAL BAR ON HORIZONTAL STROKE
- CX02 R SMALL ELEMENT OF WITH VERTICAL BAR ON HORIZONTAL STROKE
- CX03 R ELEMENT OF WITH DOT ABOVE
[composed: U+2208 + U+0307]
- CX04 R ELEMENT OF WITH OVERBAR
[composed: U+2208 + U+0304]
- CX05 R SMALL ELEMENT OF WITH OVERBAR
[composed: U+220A + U+0304]

CX06 R ELEMENT OF WITH UNDERBAR
 [composed: U+2208 + U+0331]
 CX07 R SMALL ELEMENT OF WITH SLASH
 [composed: U+220A + U+0338]
 CX08 R NEGATED ELEMENT OF - WITH VERTICAL STROKE
 [composed: U+2208+ U+20D2]
 CX09 R NEGATED ELEMENT OF WITH DOT ABOVE
 [composed: U+2209 + U+0307]
 CX0A R NEGATED ELEMENT OF WITH OVERBAR
 [composed: CX04 + U+0338]
 CX0B R NEGATED ELEMENT OF WITH OVERBAR - WITH VERTICAL STROKE
 [composed: CX04 + U+20D2]
 CX0C R ELEMENT OF WITH TWO HORIZONTAL STROKES
 CX0D R NEGATED ELEMENT OF WITH TWO HORIZONTAL STROKES
 [composed: CX0C + U+0338]
 CX0E R CONTAINS WITH LONG HORIZONTAL STROKE
 CX0F R CONTAINS WITH VERTICAL BAR ON HORIZONTAL STROKE
 CX10 R SMALL CONTAINS WITH VERTICAL BAR ON HORIZONTAL STROKE
 CX11 R CONTAINS WITH OVERBAR
 [composed: U+220B + U+0304]
 CX12 R SMALL CONTAINS WITH OVERBAR
 [composed: U+220D + U+0304]
 CX13 * R SMALL CONTAINS WITH SLASH
 [composed: U+220D + U+0338]
 CX14 R NEGATED CONTAINS - WITH VERTICAL STROKE
 [composed: U+220B + U+20D2]
 CX15 R NEGATED CONTAINS WITH OVERBAR
 [composed: CX11 + U+0338]
 CX16 R NEGATED CONTAINS WITH OVERBAR - WITH VERTICAL STROKE
 [composed: CX11 + U+20D2]
 CX17 R Z NOTATION BAG MEMBERSHIP

Large operators

CX18 * L N-ARY CIRCLED DOT OPERATOR
 CX19 * L N-ARY CIRCLED PLUS OPERATOR
 CX1A * L N-ARY CIRCLED TIMES OPERATOR
 CX1B L N-ARY UNION OPERATOR WITH DOT
 CX1C * L N-ARY UNION OPERATOR WITH PLUS
 CX1D * L N-ARY SQUARE INTERSECTION OPERATOR
 CX1E * L N-ARY SQUARE UNION OPERATOR
 CX1F * L TWO LOGICAL AND OPERATOR
 CX20 * L TWO LOGICAL OR OPERATOR
 CX21 L N-ARY TIMES OPERATOR
 CX22 L MODULO TWO SUM
 CX23 L SUMMATION WITH INTEGRAL
 CX24 L QUADRUPLE INTEGRAL OPERATOR
 [composed: U+222B + U+222B + U+222B + U+222B]
 CX25 * L FINITE PART INTEGRAL
 CX26 L INTEGRAL WITH DOUBLE STROKE
 CX27 L INTEGRAL AVERAGE WITH SLASH
 CX28 * L CIRCULATION FUNCTION
 CX29 L ANTICLOCKWISE INTEGRATION

CX2A L LINE INTEGRATION WITH RECTANGULAR PATH AROUND POLE
 CX2B L LINE INTEGRATION WITH SEMICIRCULAR PATH AROUND POLE
 CX2C L LINE INTEGRATION NOT INCLUDING THE POLE
 CX2D L INTEGRAL AROUND A POINT OPERATOR
 CX2E L QUATERNION INTEGRAL OPERATOR
 CX2F L INTEGRAL LEFTWARDS ARROW WITH HOOK
 CX30 L INTEGRAL CROSSED BY TIMES SIGN
 CX31 L INTEGRAL OVERPRINTED WITH CAP
 CX32 L INTEGRAL OVERPRINTED WITH CUP
 CX33 L UPPER INTEGRAL WITH OVERBAR
 [composed: U+222B + U+0304]
 CX34 L LOWER INTEGRAL WITH UNDERBAR
 [composed: U+222B + U+0331]
 CX35 L JOIN
 = large bowtie (relational database theory)
 CX36 L LARGE LEFT TRIANGLE OPERATOR
 . relational database theory
 CX37 L Z NOTATION SCHEMA COMPOSITION
 CX38 L Z NOTATION SCHEMA PIPING
 CX39 L Z NOTATION SCHEMA PROJECTION

Binary operators

CX3A B PLUS SIGN WITH SMALL CIRCLE ABOVE
 CX3B B PLUS SIGN WITH CIRCUMFLEX ACCENT ABOVE
 CX3C B PLUS SIGN WITH TILDE ABOVE
 CX3D B PLUS SIGN WITH DOT BELOW
 CX3E B PLUS SIGN WITH TILDE BELOW
 CX3F B PLUS SIGN WITH SUBSCRIPT TWO
 = nim-addition
 CX40 B FILLED TRIANGLE WITH PLUS
 CX41 B MINUS SIGN WITH COMMA ABOVE
 CX42 B MINUS SIGN WITH DOT BELOW
 CX43 B FALLING DOTS MINUS
 CX44 B RISING DOTS MINUS
 CX45 B CIRCLED PLUS WITH WHITE RIM
 CX46 B CIRCLED TIMES WITH WHITE RIM
 CX47 B PLUS SIGN IN LEFT HALF CIRCLE
 CX48 B PLUS SIGN IN RIGHT HALF CIRCLE
 CX49 B SMALL BOLD TIMES
 CX4A B MULTIPLICATION SIGN WITH DOT ABOVE
 CX4B B MULTIPLICATION SIGN WITH UNDERBAR
 CX4C B SEMIDIRECT PRODUCT TIMES SIGN WITH BOTTOM CLOSED
 CX4D B SMASH PRODUCT
 CX4E B MULTIPLICATION SIGN IN LEFT HALF CIRCLE
 CX4F B MULTIPLICATION SIGN IN RIGHT HALF CIRCLE
 CX50 B CIRCLED MULTIPLICATION SIGN WITH CIRCUMFLEX ACCENT
 CX51 B MULTIPLICATION SIGN IN DOUBLE CIRCLE
 CX52 * B CIRCLED DIVISION SIGN
 CX53 B PLUS IN TRIANGLE
 CX54 B MINUS IN TRIANGLE
 CX55 B MULTIPLY IN TRIANGLE
 CX56 * B INTERIOR PRODUCT

CX57 * B RIGHTHAND INTERIOR PRODUCT
 CX58 B INTERIOR PRODUCT - TALL VARIANT WITH NARROW FOOT
 CX59 B RIGHTHAND INTERIOR PRODUCT - TALL VARIANT WITH NARROW FOOT
 CX5A B Z NOTATION RELATIONAL COMPOSITION
 CX5B B Z NOTATION SEQUENCE CONCATENATION
 CX5C * B AMALGAMATION OR COPRODUCT
 CX5D B INTERSECTION WITH DOT
 CX5E B UNION WITH MINUS
 = Z NOTATION BAG SUBTRACTION
 CX5F B UNION WITH OVERBAR
 CX60 B INTERSECTION WITH OVERBAR
 CX61 B INTERSECTION WITH LOGICAL AND
 CX62 B UNION WITH LOGICAL OR
 CX63 B UNION ABOVE INTERSECTION
 CX64 B INTERSECTION ABOVE UNION
 CX65 B UNION ABOVE BAR ABOVE INTERSECTION
 CX66 B INTERSECTION ABOVE BAR ABOVE UNION
 CX67 B UNION BESIDE AND JOINED WITH UNION
 CX68 B INTERSECTION BESIDE AND JOINED WITH INTERSECTION
 CX69 B UNION WITH SERIFS
 CX6A B INTERSECTION WITH SERIFS
 CX6B B CLOSED UNION WITH SERIFS
 CX6C B CLOSED INTERSECTION WITH SERIFS
 CX6D B DOUBLE SQUARE INTERSECTION
 CX6E B DOUBLE SQUARE UNION
 CX6F B SQUARE INTERSECTION WITH SERIFS
 CX70 B SQUARE UNION WITH SERIFS
 CX71 B CLOSED UNION WITH SERIFS AND SMASH PRODUCT
 CX72 B LOGICAL AND WITH DOT ABOVE
 CX73 B LOGICAL OR WITH DOT ABOVE
 CX74 * B DOUBLE LOGICAL AND
 CX75 * B DOUBLE LOGICAL OR
 CX76 * B TWO INTERSECTING LOGICAL AND
 CX77 * B TWO INTERSECTING LOGICAL OR
 CX78 B SLOPING LARGE OR
 CX79 B SLOPING LARGE AND
 CX7A R LOGICAL OR OVERLAPPING LOGICAL AND
 CX7B B LOGICAL AND WITH MIDDLE STEM
 CX7C B LOGICAL OR WITH MIDDLE STEM
 CX7D B LOGICAL AND WITH HORIZONTAL DASH
 CX7E B LOGICAL OR WITH HORIZONTAL DASH
 CX7F * B LOGICAL AND WITH DOUBLE OVERBAR
 CX80 * B LOGICAL AND WITH UNDERBAR
 CX81 B LOGICAL AND WITH DOUBLE UNDERBAR
 CX82 B SMALL VEE WITH UNDERBAR
 CX83 B LOGICAL OR WITH DOUBLE OVERBAR
 CX84 * B LOGICAL OR WITH DOUBLE UNDERBAR
 CX85 B Z NOTATION DOMAIN ANTIRESTRICTION
 CX86 B Z NOTATION RANGE ANTIRESTRICTION

Relations: equal, similar, inequalities

CX87 R EQUALS SIGN WITH DOT BELOW

CX88 R NOT EQUAL TO WITH DOT ABOVE
CX89 R NOT EQUAL - WITH VERTICAL STROKE
[composed: U+003D + U+202D]
CX8A R REVERSED NOT EQUAL
[composed: U+003D + 7X0D]
CX8B R IDENTICAL WITH DOT ABOVE
[composed: U+2261 + U+0307]
CX8C R NOT EQUIVALENT - WITH VERTICAL STROKE
[composed: U+2261 + U+20D2]
CX8D R TRIPLE HORIZONTAL BAR WITH DOUBLE VERTICAL STROKE
= identical and parallel to
CX8E R TRIPLE HORIZONTAL BAR WITH TRIPLE VERTICAL STROKE
CX8F R REVERSED NOT EQUIVALENT
CX90 R NOT STRICTLY EQUIVALENT
[composed: U+2263 + U+0338]
CX91 R NOT STRICTLY EQUIVALENT - WITH VERTICAL STROKE
CX92 R TILDE OPERATOR WITH DOT
CX93 * R NOT TILDE OPERATOR - WITH VERTICAL STROKE
CX94 * R TILDE OPERATOR WITH RISING DOTS
CX95 R NOT SIMILAR OR ONE-LINE EQUALS - WITH VERTICAL STROKE
[composed: U+2243 + U+20D2]
CX96 R NOT SIMILAR OR TWO-LINE EQUALS - WITH VERTICAL STROKE
[composed: U+2245 + U+20D2]
CX97 R SIMILAR MINUS SIMILAR
CX98 R NOT SIMILAR MINUS SIMILAR
[composed: CX97 + U+0338]
CX99 R NOT SIMILAR MINUS SIMILAR - WITH VERTICAL STROKE
[composed: CX97 + U+20D2]
CX9A * R NOT EQUAL TO OR SIMILAR
[composed: U+2242 + U+0338]
CX9B * R NOT EQUAL TO OR SIMILAR - WITH VERTICAL STROKE
[composed: U+2242 + U+20D2]
CX9C * R NOT APPROXIMATELY EQUAL TO - WITH VERTICAL STROKE
[composed: U+2248 + U+20D2]
CX9D * R NOT APPROXIMATELY IDENTICAL TO
[composed: U+224B + U+0338]
CX9E R CONGRUENT WITH DOT ABOVE
CX9F R NOT CONGRUENT WITH DOT ABOVE
CXA0 * R REVERSED CONGRUENT
CXA1 R DOUBLE TILDE OPERATOR WITH CIRCUMFLEX ACCENT
CXA2 R APPROXIMATELY EQUAL OR EQUAL TO
CXA3 R NOT APPROXIMATELY EQUAL OR EQUAL TO
[composed: CXA2 + U+0338]
CXA4 R NOT APPROXIMATELY EQUAL OR EQUAL TO - WITH VERTICAL STROKE
[composed: CXA2 + U+20D2]
CXA5 R NOT ASYMPTOTICALLY EQUAL TO - WITH VERTICAL STROKE
[composed: U+224D + U+20D2]
CXA6 B EQUALS ABOVE PLUS
CXA7 B PLUS ABOVE EQUALS
CXA8 * R EQUALS ABOVE SIMILAR
CXA9 R DOUBLE COLON EQUALS
CXAA R TWO CONSECUTIVE EQUAL SIGNS
CXAB R THREE CONSECUTIVE EQUAL SIGNS
CXAC * R EQUALS SIGN WITH FOUR DOTS

CXAD R EQUIVALENT WITH FOUR DOTS ABOVE
CXAE R LESS-THAN WITH CIRCLE INSIDE
CXAF R GREATER-THAN WITH CIRCLE INSIDE
CXB0 R LESS-THAN WITH QUESTION MARK ABOVE
CXB1 R GREATER-THAN WITH QUESTION MARK ABOVE
CXB2 * R LESS-THAN OR SLANTED EQUAL TO
CXB3 * R GREATER-THAN OR SLANTED EQUAL TO
CXB4 R LESS-THAN OR SLANTED EQUAL TO WITH DOT INSIDE
CXB5 R GREATER-THAN OR SLANTED EQUAL TO WITH DOT INSIDE
CXB6 R LESS-THAN OR SLANTED EQUAL TO WITH DOT ABOVE
CXB7 R GREATER-THAN OR SLANTED EQUAL TO WITH DOT ABOVE
CXB8 R LESS-THAN OR SLANTED EQUAL TO WITH DOT ABOVE RIGHT
CXB9 R GREATER-THAN OR SLANTED EQUAL TO WITH DOT ABOVE LEFT
CXBA R LESS-THAN OR SIMILAR - FOLLOWING THE SLANT OF THE LOWER LEG
CXBB R GREATER-THAN OR SIMILAR - FOLLOWING THE SLANT OF THE LOWER LEG
CXBC * R LESS-THAN OR APPROXIMATE
CXBD * R GREATER-THAN OR APPROXIMATE
CXBE * R LESS-THAN AND NOT ONE-LINE EQUALS
CXBF * R GREATER-THAN AND NOT ONE-LINE EQUALS
CXC0 * R LESS-THAN AND NOT TWO-LINE EQUALS - WITH VERTICAL STROKE
CXC1 * R GREATER-THAN AND NOT TWO-LINE EQUALS - WITH VERTICAL STROKE
CXC2 * R LESS-THAN AND NOT APPROXIMATE
CXC3 * R GREATER-THAN AND NOT APPROXIMATE
CXC4 * R NOT LESS-THAN - WITH VERTICAL STROKE
[composed: U+2266 + U+20D2]
CXC5 * R NOT GREATER-THAN - WITH VERTICAL STROKE
[composed: U+2267 + U+20D2]
CXC6 * R NOT LESS-THAN OR EQUAL TO - WITH VERTICAL STROKE
[composed: U+2264 + U+20D2]
CXC7 * R NOT GREATER-THAN OR EQUAL TO - WITH VERTICAL STROKE
[composed: U+2265 + U+20D2]
CXC8 R NOT LESS-THAN OR SLANTED EQUAL TO - WITH VERTICAL STROKE
[composed: E2FA + U+20D2]
CXC9 R NOT GREATER-THAN OR SLANTED EQUAL TO - WITH VERTICAL STROKE
[composed: E2FB + U+20D2]
CXCA * R NOT LESS-THAN OR TWO-LINE EQUALS
[composed: U+2266 + U+0338]
CXCB * R NOT GREATER-THAN OR TWO-LINE EQUALS
[composed: U+2267 + U+0338]
CXCC R NOT LESS-THAN OR TWO-LINE EQUALS - WITH VERTICAL STROKE
[composed: U+2266 + U+20D2]
CXCD R NOT GREATER-THAN OR TWO-LINE EQUALS - WITH VERTICAL STROKE
[composed: U+2267 + U+20D2]
CXCE * R NOT LESS-THAN OR SIMILAR - WITH VERTICAL STROKE
[composed: U+2266 + U+20D2]
CXCF * R NOT GREATER-THAN OR SIMILAR - WITH VERTICAL STROKE
[composed: U+2267 + U+20D2]
CXD0 * R LESS-THAN ABOVE SLANTED EQUAL ABOVE GREATER-THAN
CXD1 * R GREATER-THAN ABOVE SLANTED EQUAL ABOVE LESS-THAN
CXD2 * R LESS-THAN ABOVE TWO-LINE EQUALS ABOVE GREATER-THAN
CXD3 * R GREATER-THAN ABOVE TWO-LINE EQUALS ABOVE LESS-THAN
CXD4 R LESS-THAN ABOVE SIMILAR OR EQUAL
CXD5 R GREATER-THAN ABOVE SIMILAR OR EQUAL
CXD6 R LESS-THAN ABOVE SIMILAR ABOVE GREATER-THAN

CXD7 R GREATER-THAN ABOVE SIMILAR ABOVE LESS-THAN
CXD8 R LESS-THAN ABOVE GREATER-THAN ABOVE EQUALS
CXD9 R GREATER-THAN ABOVE LESS-THAN ABOVE EQUALS
CXDA R LESS-THAN ABOVE SLANTED EQUAL ABOVE GREATER-THAN ABOVE SLANTED EQUAL
CXDB R GREATER-THAN ABOVE SLANTED EQUAL ABOVE LESS-THAN ABOVE SLANTED EQUAL
CXDC * R NOT LESS-THAN OR GREATER-THAN - WITH SLASH
[composed: U+2276 + U+0338]
CXDD * R NOT GREATER-THAN OR LESS-THAN - WITH SLASH
[composed: U+2277 + U+0338]
CXDE * R SLANTED EQUAL TO OR LESS-THAN
CXDF * R SLANTED EQUAL TO OR GREATER-THAN
CXEO R NOT SLANTED EQUAL TO OR LESS-THAN
[composed: CXDE + U+0338]
CXE1 R NOT SLANTED EQUAL TO OR GREATER-THAN
[composed: CXDF + U+0338]
CXE2 R NOT SLANTED EQUAL TO OR LESS-THAN - WITH VERTICAL STROKE
[composed: CXDE + U+202D]
CXE3 R NOT SLANTED EQUAL TO OR GREATER-THAN - WITH VERTICAL STROKE
[composed: CXDF + U+202D]
CXE4 R SLANTED EQUAL TO OR LESS-THAN WITH DOT INSIDE
CXE5 R SLANTED EQUAL TO OR GREATER-THAN WITH DOT INSIDE
CXE6 R TWO-LINE EQUAL TO OR LESS-THAN
CXE7 R TWO-LINE EQUAL TO OR GREATER-THAN
CXE8 R TWO-LINE SLANTED EQUAL TO OR LESS-THAN
CXE9 R TWO-LINE SLANTED EQUAL TO OR GREATER-THAN
CXEA R NOT TWO-LINE SLANTED EQUAL TO OR LESS-THAN
[composed: CXE8 + U+0338]
CXEB R NOT TWO-LINE SLANTED EQUAL TO OR GREATER-THAN
[composed: CXE9 + U+0338]
CXEC R NOT TWO-LINE SLANTED EQUAL TO OR LESS-THAN - WITH VERTICAL STROKE
[composed: CXE8 + U+202D2]
CXED R NOT TWO-LINE SLANTED EQUAL TO OR GREATER-THAN - WITH VERTICAL STROKE
[composed: CXE9 + U+202D2]
CXEE * R SIMILAR OR LESS-THAN
CXEF * R SIMILAR OR GREATER-THAN
CXF0 R SIMILAR - FOLLOWING THE SLANT OF THE UPPER LEG - OR LESS-THAN
CXF1 R SIMILAR - FOLLOWING THE SLANT OF THE UPPER LEG - OR GREATER-THAN
CXF2 R SIMILAR ABOVE LESS-THAN ABOVE EQUAL
CXF3 R SIMILAR ABOVE GREATER-THAN ABOVE EQUAL
CXF4 R DOUBLE NESTED LESS-THAN SIGN
= absolute continuity
CXF5 R DOUBLE NESTED GREATER-THAN SIGN
CXF6 R DOUBLE LESS-THAN WITH UNDERBAR
CXF7 * R NOT DOUBLE NESTED LESS-THAN SIGN
[composed: CXF4 + U+0338]
CXF8 * R NOT DOUBLE NESTED GREATER-THAN SIGN
[composed: CXF5 + U+0338]
CXF9 * R NOT DOUBLE NESTED LESS-THAN - WITH VERTICAL STROKE
[composed: CXF4 + U+202D2]
CXFA R NOT DOUBLE NESTED GREATER-THAN - WITH VERTICAL STROKE
[composed: CXF5 + U+202D2]
CXFB R NOT MUCH LESS THAN
[composed: U+226A + U+0338]
CXFC R NOT MUCH GREATER THAN

[composed: U+226B + U+0338]
 CXFD R NOT TRIPLE LESS THAN
 [composed: U+22D8 + U+0338]
 CXFE R NOT TRIPLE GREATER THAN
 [composed: U+22D9 + U+0338]

	DX0	DX1	DX2	DX3	DX4	DX5	DX6	DX7	DX8	DX9	DXA	DXB	DXC	DXD	DXE	DXF
0																
1																
2																
3																
4																
5																
6																
7																
8																
9																
A																
B																
C																
D																
E																
F																

Relations: inequalities (continued)

DX00 R GREATER-THAN OVERLAPPING LESS-THAN
 DX01 R GREATER-THAN BESIDE LESS-THAN

DX02 R LESS-THAN CLOSED BY CURVE
 DX03 R GREATER-THAN CLOSED BY CURVE
 DX04 R LESS-THAN CLOSED BY CURVE ABOVE SLANTED EQUAL
 DX05 R GREATER-THAN CLOSED BY CURVE ABOVE SLANTED EQUAL
 DX06 R SMALLER THAN
 DX07 R LARGER THAN
 DX08 R SMALLER THAN OR EQUAL
 [composed: DX06 + U+0331]
 DX09 R LARGER THAN OR EQUAL
 [composed: DX07 + U+0331]
 DX0A R SMALLER THAN OR SLANTED EQUAL
 DX0B R LARGER THAN OR SLANTED EQUAL
 DX0C * R NOT BUMPY EQUALS
 [composed: U+224E + U+0338]
 DX0D R NOT BUMPY OVER ONE-LINE EQUALS
 [composed: U+224F + U+0338]
 DX0E * R BUMPY OVER TWO-LINE EQUALS

Relations: precede, succeed

DX0F * R PRECEDES ABOVE ONE-LINE EQUALS
 [composed: U+227A + U+0331]
 DX10 * R SUCCEEDS ABOVE ONE-LINE EQUALS
 [composed: U+227B + U+0331]
 DX11 R PRECEDES ABOVE NOT ONE-LINE EQUALS
 DX12 R SUCCEEDS ABOVE NOT ONE-LINE EQUALS
 DX13 * R PRECEDES ABOVE TWO-LINE EQUALS
 DX14 * R SUCCEEDS ABOVE TWO-LINE EQUALS
 DX15 * R PRECEDES ABOVE NOT TWO-LINE EQUALS
 DX16 * R SUCCEEDS ABOVE NOT TWO-LINE EQUALS
 DX17 * R PRECEDES ABOVE DOUBLE TILDE OPERATOR
 DX18 * R SUCCEEDS ABOVE DOUBLE TILDE OPERATOR
 DX19 * R PRECEDES ABOVE NOT DOUBLE TILDE OPERATOR
 DX1A * R SUCCEEDS ABOVE NOT DOUBLE TILDE OPERATOR
 DX1B R PRECEDES WITH VERTICAL STROKE
 [composed: U+227A + U+20D2]
 DX1C R SUCCEEDS WITH VERTICAL STROKE
 [composed: U+227B + U+20D2]
 DX1D * R NEGATED PRECEDES ABOVE ONE-LINE EQUALS
 [composed: DX0F + U+0338]
 DX1E * R NEGATED SUCCEEDS ABOVE ONE-LINE EQUALS
 [composed: DX10 + U+0338]
 DX1F R NEGATED PRECEDES ABOVE CONTOUR EQUALS - WITH VERTICAL STROKE
 [composed: U+227C + U+20D2]
 DX20 R NEGATED SUCCEEDS ABOVE CONTOUR EQUALS - WITH VERTICAL STROKE
 [composed: U+227D + U+20D2]
 DX21 * R NEGATED PRECEDES ABOVE TILDE OPERATOR
 [composed: U+227E + U+0338]
 DX22 * R NEGATED SUCCEEDS ABOVE TILDE OPERATOR
 [composed: U+227F + U+0338]
 DX23 R NEGATED CONTOUR EQUALS ABOVE PRECEDES - WITH VERTICAL STROKE
 [composed: U+22DE + U+20D2]
 DX24 R NEGATED CONTOUR EQUALS ABOVE SUCCEEDS - WITH VERTICAL STROKE

[composed: U+22DF + U+20D2]
 DX25 R DOUBLE PRECEDES
 DX26 R DOUBLE SUCCEEDS

Relations: subset, superset

DX27 R SUBSET WITH VERTICAL STROKE
 [composed: U+2282 + U+20D2]
 DX28 R SUPERSET WITH VERTICAL STROKE
 [composed: U+2283 + U+20D2]
 DX29 R SUBSET WITH DOT
 DX2A R SUPERSET WITH DOT
 DX2B R SUBSET WITH PLUS BELOW
 DX2C R SUPERSET WITH PLUS BELOW
 DX2D R SUBSET WITH MULTIPLICATION SIGN BELOW
 DX2E R SUPERSET WITH MULTIPLICATION SIGN BELOW
 DX2F R SUBSET OF OR EQUAL TO WITH VERTICAL STROKE
 [composed: U+2286 + U+20D2]
 DX30 R SUPERSET OF OR EQUAL TO WITH VERTICAL STROKE
 [composed: U+2287 + U+20D2]
 DX31 R SUBSET OF OR EQUAL TO WITH DOT ABOVE
 DX32 R SUPERSET OF OR EQUAL TO WITH DOT ABOVE
 DX33 * R SUBSET OF OR TWO-LINE EQUALS
 DX34 * R SUPERSET OF OR TWO-LINE EQUALS
 DX35 R SUBSET OF ABOVE TILDE OPERATOR
 DX36 R SUPERSET OF ABOVE TILDE OPERATOR
 DX37 R SUBSET OF ABOVE DOUBLE TILDE OPERATOR
 DX38 R SUPERSET OF ABOVE DOUBLE TILDE OPERATOR
 DX39 * R SUBSET ABOVE ONE-LINE EQUALS WITH SLASH THROUGH BOTTOM LEG AND EQUALS
 DX3A * R SUPERSET ABOVE ONE-LINE EQUALS WITH SLASH THROUGH BOTTOM LEG AND EQUALS
 DX3B * R SUBSET OF OR NOT TWO-LINE EQUALS
 DX3C * R SUPERSET OF OR NOT TWO-LINE EQUALS
 DX3D * R SUBSET ABOVE TWO-LINE EQUALS WITH SLASH THROUGH BOTTOM LEG AND EQUALS
 DX3E * R SUPERSET ABOVE TWO-LINE EQUALS WITH SLASH THROUGH BOTTOM LEG AND EQUALS
 DX3F * R NEGATED SUBSET OF OR TWO-LINE EQUALS
 [composed: DX33 + U+0338]
 DX40 * R NEGATED SUPERSET OF OR TWO-LINE EQUALS
 [composed: DX34 + U+0338]
 DX41 R NEGATED SUBSET OF OR TWO-LINE EQUALS - WITH VERTICAL STROKE
 [composed: DX33 + U+20D2]
 DX42 R NEGATED SUPERSET OF OR TWO-LINE EQUALS - WITH VERTICAL STROKE
 [composed: DX34 + U+20D2]
 DX43 * R NEGATED SQUARE SUBSET
 [composed: U+228F + U+0338]
 DX44 * R NEGATED SQUARE SUPERSET
 [composed: U+2290 + U+0338]
 DX45 R SQUARE LEFT OPEN BOX OPERATOR
 DX46 R SQUARE RIGHT OPEN BOX OPERATOR
 DX47 R CLOSED SUBSET
 DX48 R CLOSED SUPERSET
 DX49 R CLOSED SUBSET OR EQUALS
 DX4A R CLOSED SUPERSET OR EQUALS
 DX4B R SUBSET ABOVE SUPERSET

DX4C R SUPERSET ABOVE SUBSET
 DX4D R SUBSET ABOVE SUBSET
 DX4E R SUPERSET ABOVE SUPERSET
 DX4F R SUPERSET BESIDE SUBSET
 DX50 R SUPERSET BESIDE AND JOINED BY DASH WITH SUBSET

Relations: forks

DX51 R ELEMENT OF OPENING DOWNWARDS
 DX52 R PITCHFORK WITH TEE TOP
 DX53 * R TRANSVERSAL INTERSECTION
 DX54 R FORKING
 . symbol is slashed although positive
 DX55 R NONFORKING
 . negative symbol - has no slash

Turnstiles

DX56 R SHORT LEFT TACK
 DX57 R SHORT DOWN TACK
 DX58 R SHORT UP TACK
 DX59 R PERPENDICULAR WITH S
 DX5A R VERTICAL BAR TRIPLE RIGHT TURNSTILE
 = ordinarily satisfies
 DX5B R DOUBLE VERTICAL BAR LEFT TURNSTILE
 DX5C R VERTICAL BAR DOUBLE LEFT TURNSTILE
 DX5D R DOUBLE VERTICAL BAR DOUBLE LEFT TURNSTILE
 DX5E * R LONG DASH FROM LEFT MEMBER OF DOUBLE VERTICAL
 DX5F R VERTICAL WITH LOW BAR TO LEFT FROM BASE
 DX60 R VERTICAL WITH LOW BAR TO RIGHT FROM BASE
 DX61 R SHORT DOWN TACK OVERBAR
 → 22A4 down tack
 DX62 R SHORT UP TACK WITH UNDERBAR
 → 22A5 up tack
 DX63 R SHORT UP TACK OVER SHORT DOWN TACK
 DX64 R DOUBLE DOWN TACK
 DX65 * R DOUBLE UP TACK
 = independence (probability theory)
 DX66 R NOT WITH TWO HORIZONTAL STROKES
 DX67 R REVERSED NOT WITH TWO HORIZONTAL STROKES

Delimiters

DX68 F TRIPLE VERTICAL BAR DELIMITER
 DX69 F Z NOTATION SPOT
 . medium-sized filled circle
 DX6A F Z NOTATION TYPE COLON
 DX6B O LEFT WHITE BRACE
 DX6C C RIGHT WHITE BRACE
 DX6D * O LEFT WHITE ANGULAR BRACKET
 → 3108 left white tortoise shell bracket

DX6E * C RIGHT WHITE ANGULAR BRACKET
 → 3109 right white tortoise shell bracket
 DX6F O Z NOTATION LEFT IMAGE BRACKET
 DX70 C Z NOTATION RIGHT IMAGE BRACKET
 DX71 O Z NOTATION LEFT BINDING BRACKET
 DX72 C Z NOTATION RIGHT BINDING BRACKET
 DX73 O LEFT BRACKET UNDERBAR
 DX74 C RIGHT BRACKET UNDERBAR
 DX75 O LEFT BRACKET WITH REVERSED SOLIDUS TOP CORNER
 DX76 C RIGHT BRACKET WITH REVERSED SOLIDUS BOTTOM CORNER
 DX77 O LEFT BRACKET WITH SOLIDUS BOTTOM CORNER
 DX78 C RIGHT BRACKET WITH SOLIDUS TOP CORNER
 DX79 O LEFT ANGLE BRACKET WITH DOT
 DX7A C RIGHT ANGLE BRACKET WITH DOT
 DX7B * O LEFT ARC LESS-THAN BRACKET
 DX7C * C RIGHT ARC GREATER-THAN BRACKET
 DX7D DOUBLE LEFT ARC GREATER-THAN BRACKET
 DX7E DOUBLE RIGHT ARC LESS-THAN BRACKET
 DX7F RIGHT MOUSTACHE
 DX80 LEFT MOUSTACHE
 DX81 [removed: AX25]
 DX82 [removed: AX26]

Vertical non-delimiters

DX83 R DOES NOT DIVIDE WITH REVERSED NEGATION SLASH
 DX84 R CIRCLE WITH VERTICAL LINE BELOW
 DX85 R VERTICAL LINE WITH CIRCLE BELOW
 DX86 N TOP WITH CIRCLE BELOW
 DX87 B PARALLEL WITH HORIZONTAL STROKE
 DX88 R PARALLEL WITH OVERPRINTED TILDE OPERATOR
 DX89 R SLANTED PARALLEL
 DX8A R NEGATED SLANTED PARALLEL
 [composed: DX89 + AXOE]
 DX8B B TRIPLE VERTICAL BAR BINARY RELATION
 DX8C B TRIPLE VERTICAL BAR WITH SLASH
 DX8D B TRIPLE VERTICAL BAR WITH HORIZONTAL STROKE
 DX8E [removed: 2506]
 DX8F B TRIPLE COLON
 . logic
 DX90 F DOTTED FENCE
 . four close dots vertical
 DX91 VERTICAL ZIG-ZAG LINE

Angles

DX92 MEASURED ANGLE OPENING LEFT
 DX93 RIGHT ANGLE VARIANT WITH SQUARE
 DX94 MEASURED RIGHT ANGLE WITH DOT
 DX95 ANGLE WITH S INSIDE
 DX96 ACUTE ANGLE
 DX97 SPHERICAL ANGLE OPENING LEFT

DX98 SPHERICAL ANGLE OPENING UP
 DX99 TURNED ANGLE
 DX9A REVERSED ANGLE
 DX9B ANGLE WITH UNDERBAR
 DX9C REVERSED ANGLE WITH UNDERBAR
 DX9D ANGLE WITH VERTICAL STROKE
 [composed: U+2220 + U+20D2]
 DX9E LARGE DOWNWARDS POINTING ANGLE
 DX9F LARGE UPWARDS POINTING ANGLE
 DXA0 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING UP AND TO THE RIGHT
 DXA1 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING UP AND TO THE LEFT
 DXA2 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING DOWN AND TO THE RIGHT
 DXA3 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING DOWN AND TO THE LEFT
 DXA4 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING RIGHT AND UP
 DXA5 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING LEFT AND UP
 DXA6 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING RIGHT AND DOWN
 DXA7 MEASURED ANGLE WITH OPEN ARM ENDING IN ARROW POINTING LEFT AND DOWN

Empty set, circles, squares, triangles

DXA8 [removed: 2205]
 DXA9 N INVERTED EMPTY SET
 [composed: U+25CB + AXOE]
 DXAA N EMPTY SET OVERBAR
 DXAB N EMPTY SET WITH SMALL CIRCLE ABOVE
 DXAC N EMPTY SET RIGHT ARROW ABOVE
 DXAD N EMPTY SET LEFT ARROW ABOVE
 DXAE * CIRCLE WITH HORIZONTAL BAR
 DXAF TWO HORIZONTAL BARS IN CIRCLE
 DXB0 * B CIRCLED VERTICAL BAR
 DXB1 B CIRCLED PARALLEL
 DXB2 B CIRCLED REVERSED SOLIDUS
 DXB3 B CIRCLED PERPENDICULAR
 DXB4 CIRCLE DIVIDED BY HORIZONTAL BAR AND TOP HALF DIVIDED BY VERTICAL
 DXB5 CIRCLE WITH SUPERIMPOSED X
 DXB6 CIRCLED ANTICLOCKWISE-ROTATED DIVISION SIGN
 DXB7 UP ARROW THROUGH CIRCLE
 DXB8 CIRCLED LARGE CIRCLE
 → 233E apl functional symbol circle jot
 DXB9 CIRCLED FILLED CIRCLE
 DXBA * CIRCLED LESS-THAN
 DXBB * CIRCLED GREATER-THAN
 DXBC CIRCLE WITH SMALL CIRCLE TO THE RIGHT
 DXBD CIRCLE WITH TWO HORIZONTAL STROKES TO THE RIGHT
 DXBE * SQUARED SOLIDUS
 → 2341 apl functional symbol quad slash
 DXBF * SQUARED REVERSED SOLIDUS
 → 2342 apl functional symbol quad backslash
 DXC0 SQUARED ASTERISK
 [composed: U+2217 + U+20DE]
 DXC1 SQUARED SMALL CIRCLE
 → 233B apl functional symbol quad circle
 DXC2 B SQUARED SQUARE

[composed: U+25AB + U+20DE]
DXC3 TWO JOINED SQUARES
DXC4 TRIANGLE WITH DOT OVER
DXC5 * TRIANGLE WITH UNDERBAR
DXC6 S IN TRIANGLE
DXC7 B TRIANGLE WITH SERIFS AT BOTTOM
DXC8 * R LEFT TRIANGLE UNDERBAR NEGATED BY VERTICAL STROKE
[composed: U+22B4 + U+20D2]
DXC9 * R RIGHT TRIANGLE UNDERBAR NEGATED BY VERTICAL STROKE
[composed: U+22B5 + U+20D2]
DXCA R RIGHT TRIANGLE ABOVE LEFT TRIANGLE
DXCB R LEFT TRIANGLE BESIDE VERTICAL BAR
DXCC R VERTICAL BAR BESIDE RIGHT TRIANGLE
DXCD R NEGATED LEFT TRIANGLE BESIDE VERTICAL BAR
[composed: DXCB + U+0338]
DXCE R NEGATED VERTICAL BAR BESIDE RIGHT TRIANGLE
[composed: DXCC + U+0338]

Bowtie, hourglass

DXCF R LEFT FILLED BOWTIE
DXD0 R RIGHT FILLED BOWTIE
DXD1 R FILLED BOWTIE
DXD2 R LEFT FILLED TIMES
→ 22C9 left normal factor semidirect product
DXD3 R RIGHT FILLED TIMES
→ 22CA right normal factor semidirect product
DXD4 WHITE HOURGLASS PLUS
DXD5 FILLED HOURGLASS

Miscellaneous relations

DXD6 MOST POSITIVE
DXD7 CONGRUENCE SIGN - LAZY S
DXD8 REVERSED MOST POSITIVE WITH LINE BELOW
DXD9 MOST POSITIVE WITH TWO LINES BELOW
DXDA [removed: 221D]
DXDB N INFINITY SIGN WITH TOP RIGHT QUADRANT OMITTED
DXDC N TIE OVER INFINITY
DXDD N INFINITY NEGATED WITH VERTICAL BAR
DXDE R DOUBLE-ENDED MULTIMAP
DXDF N SQUARE WITH CONTOURED OUTLINE
= D'Alembertian
DXE0 R INCREASES AS
DXE1 SHUFFLE PRODUCT
DXE2 R SLANTED PARALLEL SUPERIMPOSED ON EQUALS
= homothetically congruent to
DXE3 R TILDE ABOVE SLANTED PARALLEL SUPERIMPOSED ON EQUALS
[composed: DXE2 + U+0303]
DXE4 R SLANTED PARALLEL SUPERIMPOSED ON THREE-LINE EQUALS
= congruent and parallel
DXE5 R TOP ARC OVER BOTTOM ARC

Geometric shapes and other miscellanea

DXE6	N THERMODYNAMIC . vertical bar crossed by two horizontals
DXE7	N DOWN-POINTING TRIANGLE WITH LEFT HALF BLACK
DXE8	N DOWN-POINTING TRIANGLE WITH RIGHT HALF BLACK
DXE9	UPPER LEFT TRIANGLE
DXEA	UPPER RIGHT TRIANGLE
DXEB	LOWER LEFT TRIANGLE
DXEC	N LARGE WHITE SQUARE
DXED	N LARGE FILLED SQUARE
DXEE	N EMPTY SMALL SQUARE
DXEF	N FILLED SMALL SQUARE
DXFO	N EMPTY VERY SMALL SQUARE
DXF1	N FILLED VERY SMALL SQUARE
DXF2	N WHITE DIAMOND WITH CENTERED DOT
DXF3	N FILLED DIAMOND WITH DOWN ARROW
DXF4	FILLED LOZENGE
DXF5	N TRAPEZIUM
DXF6	[removed: 2736]
DXF7	N CIRCLE WITH DOWN ARROW
DXF8	N FILLED CIRCLE WITH DOWN ARROW
DXF9	N ERROR-BARRED WHITE SQUARE
DXFA	N ERROR-BARRED FILLED SQUARE
DXFB	N ERROR-BARRED WHITE DIAMOND
DXFC	N ERROR-BARRED FILLED DIAMOND
DXFD	N ERROR-BARRED WHITE CIRCLE
DXFE	N ERROR-BARRED FILLED CIRCLE

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