

Title: Math characters and variation sequences

Source: Project Editor

Distribution: WG2 members and liaison organizations

The following document proposes changes to the Mathematical glyph representation in the charts and the introduction of representative glyphs for documented variation sequences.

Context:

Amendment 2 to ISO/IEC 10646:2012 has introduced the description of variation sequences in the code charts. However, while the sequences were added in the name list no representative glyphs were shown. With that capability now added to the Charting tool, it is possible to display the representative glyphs of the variations sequences described in clause 16.5. Therefore, to insure consistency between the standard character and its variation it is important to use the same font design for both. This has led to the introduction of a new font for many of the mathematical characters based on the Math STIX set (See <http://stixfonts.org/> for further information on the STIX project).

Example

In the main chart the glyph box for 2272 and 2273 contain a small black triangle in the upper right corner to indicate that these characters are used as base characters for variation sequences.



In the name list, a representative glyph is shown for the variation sequence.

2272	\lesssim	LESS-THAN OR EQUIVALENT TO ~ 2272 FE00 \lesssim following the slant of the lower leg
2273	\gtrsim	GREATER-THAN OR EQUIVALENT TO ~ 2273 FE00 \gtrsim following the slant of the lower leg

New glyphs for the Math character in the code chart

Beyond the motivation for consistency between the default representation and the representation used for the variation sequence, the Math STIX font set is a better representation of the mathematical characters encoded in the standard.

The code charts pages following this text show the proposed changes (highlighted in yellow) in the affected blocks:














- Letterlike Symbols (2100-214F)
- Arrows (2190-21FF)
- Mathematical Operators (2200-22FF)
- Miscellaneous Technical (2300-23FF)
- Miscellaneous Mathematical Symbols-A (27C0-27EF)
- Supplemental Arrows-A (27F0-27FF)
- Supplemental Arrows –B (2900-297F)
- Miscellaneous Mathematical Symbols-B (2980-29FF)
- Supplemental Mathematical Operators (2A00-2AFF)
- Miscellaneous Symbols and Arrows (2B00-2BFF)
- Mathematical Alphanumeric Symbols (1D400-1D5FF)

The criteria for inclusion/changes were as follows:

- The characters were available in the Math STIX font. For example, some recently added characters such as 27CA, 27CE, and 27CF, although used in math are not part of the STIX font set. Same for 1D7CA and 1D7CB.
- The characters were consistent with other included sets. This causes some arrows to be excluded (such as the ‘keyboard’ arrows in 21E6-21F3). Most of the geometric shapes were also excluded (too many conflicts in size with other sources).

Summary of standardized variation sequences after block

The charts shown in the following pages have an experimental section showing summaries of standardized variation sequences after the block in which they appear as base character (except CJK Unified Ideographs). A fragment is shown below:

Standardized Variation Sequences	
<i>Experimental listing</i>	
2229	 INTERSECTION <small>2229</small>  with serifs <small>2229 FE00</small>
222A	 UNION <small>222A</small>  with serifs <small>222A FE00</small>
2268	 LESS-THAN BUT NOT EQUAL TO <small>2268</small>  with vertical stroke <small>2268 FE00</small>
2294	 SQUARE CUP <small>2294</small>  with serifs <small>2294 FE00</small>
2295	 CIRCLED PLUS <small>2295</small>  with white rim <small>2295 FE00</small>
2297	 CIRCLED TIMES <small>2297</small>  with white rim <small>2297 FE00</small>
229C	 CIRCLED EQUALS <small>229C</small>

This (or an edited version) could be added in a future edition/amendment of the standard. However it requires that all variation sequences have a displayable representation; without them these summaries are not that useful.

Open issues

There is no convention of what could be a good representation of ‘Emoji style’ in the code charts. It could be argued that none exists by definition. The editor is open to suggestion.

Based on the current design of the charts, there is no easy solution to display the representation of variation sequences for scripts which are typically represented vertically (such as Mongolian and Phags-pa). The main reason is that commercial/production fonts that represent these characters are designed with characters laid in horizontal flow, not vertical. These commercial fonts contain these variants and it would be easier to use them accordingly for these representations. A separate document (WG2 N4435) covers that issue and possible solutions.

The chart format for the CJK Unified Ideographs provides no simple way to show the standardized variation sequences along with base characters as typical for other blocks. The suggestion is to add them to the annotation associated with the CJK Compatibility Ideographs described in the names of these variations sequences.

Example:

7DF4 FE00; CJK COMPATIBILITY IDEOGRAPH-F996

F996
系 120.9 練
KO-665F
≡ 7DF4 練
~ 7DF4 FE00

If this was accepted, the sub-clause 31.2 Characters name list describing entries with ‘~’ (introduced in 10646:2012 Amendment 2) should be modified accordingly.

What is unclear is whether a visual representation should be added, and if one is added, which one should be chosen.

Example

F907
龜 213.0 龜 龜
KO-5022 H3-8BF8
≡ 9F9C 龜
~ 9F9C FE00 龜 (K source) or
~ 9F9C FE00 龜 (H source) (glyphs shown bigger than in chart)

(It is not clear which of the glyphs corresponding to the K source or H source should be used.)

Alternatively, one standardized variant could be created for each IRG source such as:



9F9C FE00; CJK COMPATIBILITY IDEOGRAPH-F996-K

9F9C FE03; CJK COMPATIBILITY IDEOGRAPH-F996-H


(FE01 and FE02 are used for other CJK Compatibility ideographs 'related' to 9F9C)


Then the example would become:

F907
龜 213.0

	
KO-5022	H3-8BF8

≡ 9F9C 龜

~ 9F9C FE00  K source

~ 9F9C FE03  H source

Because these standardized variation sequences are not yet finalized it would probably make sense to renumber them to give consecutive numbers within a CJK Compatibility Ideograph entry (i.e. use FE00 and FE01 above and use FE02 and FE03 for the other cases).

















































































































Presentation of the charts in following pages:

The modified characters are highlighted in yellow (or light shade in black/white version). The name lists have been omitted when they do not contain mathematical variation sequences (except for the 27F0-27FF where both large characters and name list fit in the same page).

Summaries for standardized variation sequences are shown after the Mathematical Operators block (2200-22FF) and the Supplemental Mathematical Operators block (2A00-2AFF).

Page numbers for those charts pages are not in sequences (shown as page 1, 6, 10-17, 24, 27-28, 33, 37-43, 50-53).

	210	211	212	213	214
0	<i>a/c</i> 2100	<i>J</i> 2110	SM 2120	<i>E</i> 2130	Σ 2140
1	<i>a/s</i> 2101	<i>S</i> 2111	TEL 2121	<i>F</i> 2131	Θ 2141
2	C 2102	<i>L</i> 2112	TM 2122	F 2132	L 2142
3	$^{\circ}\text{C}$ 2103	<i>l</i> 2113	<i>V</i> 2123	<i>M</i> 2133	J 2143
4	E 2104	W 2114	Z 2124	<i>o</i> 2134	A 2144
5	$\%$ 2105	N 2115	Z 2125	<i>N</i> 2135	<i>D</i> 2145
6	<i>c/u</i> 2106	<i>No</i> 2116	Ω 2126	C 2136	<i>d</i> 2146
7	E 2107	P 2117	U 2127	λ 2137	<i>e</i> 2147
8	D 2108	O 2118	Z 2128	L 2138	<i>i</i> 2148
9	$^{\circ}\text{F}$ 2109	P 2119	I 2129	i 2139	<i>j</i> 2149
A	<i>g</i> 210A	Q 211A	K 212A	O 213A	E 214A
B	<i>H</i> 210B	<i>R</i> 211B	A 212B	FAX 213B	S 214B
C	<i>S</i> 210C	<i>R</i> 211C	<i>B</i> 212C	π 213C	P 214C
D	H 210D	R 211D	C 212D	Y 213D	A/S 214D
E	<i>h</i> 210E	<i>R</i> 211E	<i>e</i> 212E	L 213E	F 214E
F	<i>h</i> 210F	<i>R</i> 211F	<i>e</i> 212F	H 213F	<i>lll</i> 214F

	219	21A	21B	21C	21D	21E	21F
0	 2190	 21A0	 21B0	 21C0	 21D0	 21E0	 21F0
1	 2191	 21A1	 21B1	 21C1	 21D1	 21E1	 21F1
2	 2192	 21A2	 21B2	 21C2	 21D2	 21E2	 21F2
3	 2193	 21A3	 21B3	 21C3	 21D3	 21E3	 21F3
4	 2194	 21A4	 21B4	 21C4	 21D4	 21E4	 21F4
5	 2195	 21A5	 21B5	 21C5	 21D5	 21E5	 21F5
6	 2196	 21A6	 21B6	 21C6	 21D6	 21E6	 21F6
7	 2197	 21A7	 21B7	 21C7	 21D7	 21E7	 21F7
8	 2198	 21A8	 21B8	 21C8	 21D8	 21E8	 21F8
9	 2199	 21A9	 21B9	 21C9	 21D9	 21E9	 21F9
A	 219A	 21AA	 21BA	 21CA	 21DA	 21EA	 21FA
B	 219B	 21AB	 21BB	 21CB	 21DB	 21EB	 21FB
C	 219C	 21AC	 21BC	 21CC	 21DC	 21EC	 21FC
D	 219D	 21AD	 21BD	 21CD	 21DD	 21ED	 21FD
E	 219E	 21AE	 21BE	 21CE	 21DE	 21EE	 21FE
F	 219F	 21AF	 21BF	 21CF	 21DF	 21EF	 21FF

	220	221	222	223	224	225	226	227	228	229	22A	22B	22C	22D	22E	22F
0	∇ 2200	\amalg 2210	\sphericalangle 2220	\int 2230	ζ 2240	\doteq 2250	\neq 2260	\nlessgtr 2270	\nlessgtr 2280	\sqsupset 2290	\boxtimes 22A0	\wp 22B0	\bigwedge 22C0	\in 22D0	\nlessgtr 22E0	\ddots 22F0
1	\complement 2201	\sum 2211	\triangleleft 2221	f 2231	ζ 2241	\doteq 2251	\equiv 2261	\nlessgtr 2271	\nlessgtr 2281	\sqsubseteq 2291	\square 22A1	\wp 22B1	∇ 22C1	\supset 22D1	\nlessgtr 22E1	\ddots 22F1
2	∂ 2202	$-$ 2212	\triangleleft 2222	\oint 2232	ζ 2242	\doteq 2252	\neq 2262	\nlessgtr 2272	\subset 2282	\sqsubseteq 2292	\top 22A2	\triangle 22B2	\cup 22C2	\supseteq 22D2	\nlessgtr 22E2	\in 22F2
3	\exists 2203	\mp 2213	$ $ 2223	\oint 2233	ζ 2243	\doteq 2253	\equiv 2263	\nlessgtr 2273	\supset 2283	\sqsupset 2293	\top 22A3	\triangle 22B3	\cup 22C3	\supseteq 22D3	\nlessgtr 22E3	\in 22F3
4	\nlessgtr 2204	\dagger 2214	\dagger 2224	\ddots 2234	\nlessgtr 2244	\doteq 2254	\leq 2264	\nlessgtr 2274	\nlessgtr 2284	\sqsupset 2294	\top 22A4	\triangle 22B4	\diamond 22C4	\supseteq 22D4	\nlessgtr 22E4	\in 22F4
5	\emptyset 2205	$/$ 2215	\parallel 2225	\ddots 2235	\parallel 2245	\doteq 2255	\geq 2265	\nlessgtr 2275	\nlessgtr 2285	\oplus 2295	\perp 22A5	\triangle 22B5	\cdot 22C5	$\#$ 22D5	\nlessgtr 22E5	\in 22F5
6	\triangle 2206	\setminus 2216	$\#$ 2226	$:$ 2236	\nlessgtr 2246	\nlessgtr 2256	\leq 2266	\leq 2276	\subset 2286	\ominus 2296	\top 22A6	\circ 22B6	\star 22C6	\nlessgtr 22D6	\nlessgtr 22E6	\in 22F6
7	∇ 2207	$*$ 2217	\wedge 2227	\ddots 2237	\nlessgtr 2247	\doteq 2257	\geq 2267	\geq 2277	\supset 2287	\otimes 2297	\top 22A7	\circ 22B7	$*$ 22C7	\nlessgtr 22D7	\nlessgtr 22E7	\in 22F7
8	\in 2208	\circ 2218	∇ 2228	\cdot 2238	\approx 2248	\equiv 2258	\nlessgtr 2268	\nlessgtr 2278	\nlessgtr 2288	\ominus 2298	\top 22A8	\circ 22B8	\otimes 22C8	\ll 22D8	\nlessgtr 22E8	\in 22F8
9	\nlessgtr 2209	\cdot 2219	\cup 2229	\cdot 2239	\nlessgtr 2249	\equiv 2259	\nlessgtr 2269	\nlessgtr 2279	\nlessgtr 2289	\odot 2299	\top 22A9	\dagger 22B9	\otimes 22C9	\ll 22D9	\nlessgtr 22E9	\in 22F9
A	\in 220A	$\sqrt{\quad}$ 221A	\cup 222A	\ddots 223A	\approx 224A	\leq 225A	\ll 226A	\nlessgtr 227A	\nlessgtr 228A	\odot 229A	\top 22AA	\top 22BA	\otimes 22CA	\ll 22DA	\nlessgtr 22EA	\in 22FA
B	\supseteq 220B	$\sqrt[3]{\quad}$ 221B	\int 222B	\approx 223B	\approx 224B	\equiv 225B	\ll 226B	\nlessgtr 227B	\nlessgtr 228B	\otimes 229B	\top 22AB	∇ 22BB	\nlessgtr 22CB	\ll 22DB	\nlessgtr 22EB	\in 22FB
C	\nlessgtr 220C	$\sqrt[4]{\quad}$ 221C	\iint 222C	\approx 223C	\approx 224C	\equiv 225C	\nlessgtr 226C	\nlessgtr 227C	\nlessgtr 228C	\ominus 229C	\nlessgtr 22AC	\nlessgtr 22BC	\nlessgtr 22CC	\nlessgtr 22DC	\nlessgtr 22EC	\in 22FC
D	\supseteq 220D	α 221D	\iiint 222D	\approx 223D	\nlessgtr 224D	\equiv 225D	\nlessgtr 226D	\nlessgtr 227D	\nlessgtr 228D	\ominus 229D	\nlessgtr 22AD	∇ 22BD	\nlessgtr 22CD	\nlessgtr 22DD	\nlessgtr 22ED	\in 22FD
E	\blacksquare 220E	∞ 221E	\oint 222E	\approx 223E	\nlessgtr 224E	\equiv 225E	\nlessgtr 226E	\nlessgtr 227E	\nlessgtr 228E	\oplus 229E	\nlessgtr 22AE	\nlessgtr 22BE	\nlessgtr 22CE	\nlessgtr 22DE	\ddots 22EE	\in 22FE
F	\amalg 220F	\perp 221F	\int 222F	\approx 223F	\nlessgtr 224F	\equiv 225F	\nlessgtr 226F	\nlessgtr 227F	\sqsupset 228F	\square 229F	\nlessgtr 22AF	\triangle 22BF	\nlessgtr 22CF	\nlessgtr 22DF	\ddots 22EF	\in 22FF

Miscellaneous mathematical symbols

2200	\forall	FOR ALL = universal quantifier
2201	\complement	COMPLEMENT → 0297 \complement latin letter stretched c
2202	∂	PARTIAL DIFFERENTIAL
2203	\exists	THERE EXISTS = existential quantifier
2204	\nexists	THERE DOES NOT EXIST ≡ 2203 \exists 0338 $\not\exists$
2205	\emptyset	EMPTY SET = null set • used in linguistics to indicate a null morpheme or phonological “zero” → 00D8 \emptyset latin capital letter o with stroke → 2300 \emptyset diameter sign
2206	Δ	INCREMENT = Laplace operator = forward difference = symmetric difference (in set theory) • other symbols may also be used for symmetric difference → 0394 Δ greek capital letter delta → 25B3 Δ white up-pointing triangle
2207	∇	NABLA = backward difference = gradient, del • used for Laplacian operator (written with superscript 2) → 25BD ∇ white down-pointing triangle

Set membership

2208	\in	ELEMENT OF
2209	\notin	NOT AN ELEMENT OF ≡ 2208 \in 0338 $\not\in$
220A	ϵ	SMALL ELEMENT OF • originates in math pi fonts; not the straight epsilon → 03F5 ϵ greek lunate epsilon symbol
220B	\ni	CONTAINS AS MEMBER = such that
220C	$\not\ni$	DOES NOT CONTAIN AS MEMBER ≡ 220B \ni 0338 $\not\ni$
220D	\ni	SMALL CONTAINS AS MEMBER → 03F6 \ni greek reversed lunate epsilon symbol

Miscellaneous mathematical symbol

220E	\blacksquare	END OF PROOF = q.e.d. → 2023 \blacktriangleright triangular bullet → 25AE \blacksquare black vertical rectangle
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N-ary operators

220F	\prod	N-ARY PRODUCT = product sign → 03A0 \prod greek capital letter pi
2210	\coprod	N-ARY COPRODUCT = coproduct sign
2211	\sum	N-ARY SUMMATION = summation sign → 03A3 \sum greek capital letter sigma → 2140 $\sum\limits$ double-struck n-ary summation

Operators

2212	$-$	MINUS SIGN → 002D $-$ hyphen-minus → 2796 — heavy minus sign
2213	\mp	MINUS-OR-PLUS SIGN → 00B1 \pm plus-minus sign
2214	$\dot{+}$	DOT PLUS
2215	$/$	DIVISION SLASH • generic division operator → 002F $/$ solidus → 2044 $/$ fraction slash → 27CB $/$ mathematical rising diagonal
2216	\setminus	SET MINUS → 005C \setminus reverse solidus → 27CD \setminus mathematical falling diagonal → 29F5 \setminus reverse solidus operator
2217	$*$	ASTERISK OPERATOR → 002A $*$ asterisk
2218	\circ	RING OPERATOR = composite function = APL jot → 00B0 $^\circ$ degree sign → 0970 $^\circ$ devanagari abbreviation sign → 25E6 \circ white bullet → 10B39 $^\circ$ avestan abbreviation mark
2219	\bullet	BULLET OPERATOR → 00B7 \bullet middle dot → 2022 \bullet bullet → 2024 \cdot one dot leader
221A	$\sqrt{\quad}$	SQUARE ROOT = radical sign → 2713 \checkmark check mark
221B	$\sqrt[3]{\quad}$	CUBE ROOT → 0606 $\sqrt[3]{\quad}$ arabic-indic cube root
221C	$\sqrt[4]{\quad}$	FOURTH ROOT → 0607 $\sqrt[4]{\quad}$ arabic-indic fourth root
221D	\propto	PROPORTIONAL TO → 03B1 α greek small letter alpha

Miscellaneous mathematical symbols

221E	∞	INFINITY
221F	\perp	RIGHT ANGLE
2220	\sphericalangle	ANGLE
2221	\sphericalangle	MEASURED ANGLE
2222	\sphericalangle	SPHERICAL ANGLE = angle arc

Relations

2223	\mid	DIVIDES = such that = APL stile → 007C \mid vertical line → 01C0 \mid latin letter dental click
2224	\nmid	DOES NOT DIVIDE ≡ 2223 \mid 0338 $\not\mid$
2225	\parallel	PARALLEL TO → 01C1 \parallel latin letter lateral click → 2016 \parallel double vertical line
2226	\nparallel	NOT PARALLEL TO ≡ 2225 \parallel 0338 $\not\parallel$

Logical and set operators

2227	\wedge	LOGICAL AND = wedge, conjunction → 22C0 \bigwedge n-ary logical and → 2303 \frown up arrowhead
2228	\vee	LOGICAL OR = vee, disjunction → 22C1 \bigvee n-ary logical or → 2304 \vee down arrowhead
2229	\cap	INTERSECTION = cap, hat → 22C2 \bigcap n-ary intersection ~ 2229 FE00 \cap with serifs
222A	\cup	UNION = cup → 22C3 \bigcup n-ary union ~ 222A FE00 \cup with serifs

Integrals

222B	\int	INTEGRAL → 0283 \int latin small letter esh
222C	\iint	DOUBLE INTEGRAL ≈ 222B \int 222B \int
222D	\iiint	TRIPLE INTEGRAL → 2A0C \iiint quadruple integral operator ≈ 222B \int 222B \int 222B \int
222E	\oint	CONTOUR INTEGRAL → 2A15 \oint integral around a point operator
222F	\oiint	SURFACE INTEGRAL ≈ 222E \oint 222E \oint
2230	\iiint	VOLUME INTEGRAL ≈ 222E \oint 222E \oint 222E \oint
2231	$\int\limits_{\curvearrowright}$	CLOCKWISE INTEGRAL
2232	$\oint\limits_{\curvearrowright}$	CLOCKWISE CONTOUR INTEGRAL
2233	$\oint\limits_{\curvearrowleft}$	ANTICLOCKWISE CONTOUR INTEGRAL • clockwise or anticlockwise arrows do not reverse during layout mirroring

Miscellaneous mathematical symbols

2234	\therefore	THEREFORE → 26EC \therefore historic site
2235	\because	BECAUSE

Relations

2236	$:$	RATIO → 003A $:$ colon
2237	$::$	PROPORTION

Operator

2238	$\dot{-}$	DOT MINUS = saturating subtraction • sometimes claimed as notation for symmetric set difference, but 2206 Δ is preferred
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Relation

2239	$-:$	EXCESS
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Operator

223A	\doteq	GEOMETRIC PROPORTION
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Relations

223B	\simeq	HOMOTHETIC → 2A6B \simeq tilde operator with rising dots
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223C	\sim	TILDE OPERATOR = varies with (proportional to) = difference between = similar to = not = cycle = APL tilde → 007E \sim tilde → 00AC \nrightarrow not sign → 02DC $\small\sim$ small tilde
223D	\smile	REVERSED TILDE = lazy S • reversed tilde and lazy S are glyph variants
223E	\simeq	INVERTED LAZY S = most positive

Miscellaneous mathematical symbol

223F	\sim	SINE WAVE = alternating current
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Operator

2240	\wr	WREATH PRODUCT
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Relations

2241	\napprox	NOT TILDE ≡ 223C \sim 0338 $\not\sim$
2242	\ncong	MINUS TILDE
2243	\asymp	ASYMPTOTICALLY EQUAL TO
2244	$\not\asymp$	NOT ASYMPTOTICALLY EQUAL TO ≡ 2243 \asymp 0338 $\not\asymp$
2245	\approx	APPROXIMATELY EQUAL TO
2246	$\not\approx$	APPROXIMATELY BUT NOT ACTUALLY EQUAL TO
2247	$\not\cong$	NEITHER APPROXIMATELY NOR ACTUALLY EQUAL TO ≡ 2245 \approx 0338 $\not\cong$
2248	\approx	ALMOST EQUAL TO = asymptotic to
2249	$\not\approx$	NOT ALMOST EQUAL TO ≡ 2248 \approx 0338 $\not\approx$
224A	\approx	ALMOST EQUAL OR EQUAL TO
224B	\approx	TRIPLE TILDE
224C	\equiv	ALL EQUAL TO • reversed tilde and lazy S are glyph variants
224D	\simeq	EQUIVALENT TO
224E	\simeq	GEOMETRICALLY EQUIVALENT TO
224F	\simeq	DIFFERENCE BETWEEN
2250	\doteq	APPROACHES THE LIMIT
2251	\doteq	GEOMETRICALLY EQUAL TO
2252	\doteq	APPROXIMATELY EQUAL TO OR THE IMAGE OF = nearly equals
2253	\doteq	IMAGE OF OR APPROXIMATELY EQUAL TO
2254	\doteq	COLON EQUALS
2255	\doteq	EQUALS COLON
2256	\doteq	RING IN EQUAL TO
2257	\doteq	RING EQUAL TO = approximately equal to
2258	\doteq	CORRESPONDS TO
2259	\doteq	ESTIMATES = corresponds to
225A	\doteq	EQUIANGULAR TO
225B	\doteq	STAR EQUALS
225C	\doteq	DELTA EQUAL TO = equiangular = equal to by definition

225D	\equiv	EQUAL TO BY DEFINITION
225E	\equiv	MEASURED BY
225F	$\stackrel{?}{\equiv}$	QUESTIONED EQUAL TO
2260	\neq	NOT EQUAL TO → 003D = equals sign → 01C2 † latin letter alveolar click ≡ 003D = 0338 \neq
2261	\equiv	IDENTICAL TO
2262	\neq	NOT IDENTICAL TO ≡ 2261 ≡ 0338 \neq
2263	\equiv	STRICTLY EQUIVALENT TO
2264	\leq	LESS-THAN OR EQUAL TO
2265	\geq	GREATER-THAN OR EQUAL TO
2266	\leq	LESS-THAN OVER EQUAL TO
2267	\geq	GREATER-THAN OVER EQUAL TO
2268	\leq	LESS-THAN BUT NOT EQUAL TO ~ 2268 FE00 \leq with vertical stroke
2269	\geq	GREATER-THAN BUT NOT EQUAL TO ~ 2269 FE00 \geq with vertical stroke
226A	\ll	MUCH LESS-THAN → 00AB \ll left-pointing double angle quotation mark
226B	\gg	MUCH GREATER-THAN → 00BB \gg right-pointing double angle quotation mark
226C	\bowtie	BETWEEN = plaintiff, quantic
226D	\napprox	NOT EQUIVALENT TO ≡ 224D \napprox 0338 \napprox
226E	\nless	NOT LESS-THAN ≡ 003C < 0338 \nless
226F	\ngtr	NOT GREATER-THAN ≡ 003E > 0338 \ngtr
2270	\nlessgtr	NEITHER LESS-THAN NOR EQUAL TO ≡ 2264 \leq 0338 \nlessgtr
2271	\ngtrless	NEITHER GREATER-THAN NOR EQUAL TO ≡ 2265 \geq 0338 \ngtrless
2272	\lesssim	LESS-THAN OR EQUIVALENT TO ~ 2272 FE00 \lesssim following the slant of the lower leg
2273	\gtrsim	GREATER-THAN OR EQUIVALENT TO ~ 2273 FE00 \gtrsim following the slant of the lower leg
2274	\nlessgtr	NEITHER LESS-THAN NOR EQUIVALENT TO ≡ 2272 \lesssim 0338 \nlessgtr
2275	\ngtrless	NEITHER GREATER-THAN NOR EQUIVALENT TO ≡ 2273 \gtrsim 0338 \ngtrless
2276	\lesseqgtr	LESS-THAN OR GREATER-THAN
2277	\gtrlessseq	GREATER-THAN OR LESS-THAN
2278	\nlessgtr	NEITHER LESS-THAN NOR GREATER-THAN ≡ 2276 \lesseqgtr 0338 \nlessgtr
2279	\ngtrless	NEITHER GREATER-THAN NOR LESS-THAN ≡ 2277 \gtrlessseq 0338 \ngtrless
227A	\prec	PRECEDES = lower rank than → 22B0 \prec precedes under relation
227B	\succ	SUCCEEDS = higher rank than → 22B1 \succ succeeds under relation
227C	\preceq	PRECEDES OR EQUAL TO
227D	\succeq	SUCCEEDS OR EQUAL TO
227E	\preceq	PRECEDES OR EQUIVALENT TO
227F	\succeq	SUCCEEDS OR EQUIVALENT TO

2280	\nprec	DOES NOT PRECEDE ≡ 227A < 0338 \nprec
2281	\nsuc	DOES NOT SUCCEED ≡ 227B > 0338 \nsuc
2282	\subset	SUBSET OF = included in set → 2E26 \subset left sideways u bracket
2283	\supset	SUPERSET OF = includes in set → 2E27 \supset right sideways u bracket
2284	$\not\subset$	NOT A SUBSET OF ≡ 2282 \subset 0338 $\not\subset$
2285	$\not\supset$	NOT A SUPERSET OF ≡ 2283 \supset 0338 $\not\supset$
2286	\subseteq	SUBSET OF OR EQUAL TO
2287	\supseteq	SUPERSET OF OR EQUAL TO
2288	$\not\subseteq$	NEITHER A SUBSET OF NOR EQUAL TO ≡ 2286 \subseteq 0338 $\not\subseteq$
2289	$\not\supseteq$	NEITHER A SUPERSET OF NOR EQUAL TO ≡ 2287 \supseteq 0338 $\not\supseteq$
228A	\subsetneq	SUBSET OF WITH NOT EQUAL TO ~ 228A FE00 \subsetneq with stroke through bottom members
228B	\supsetneq	SUPERSET OF WITH NOT EQUAL TO ~ 228B FE00 \supsetneq with stroke through bottom members

Operators

228C	\uplus	MULTISET
228D	\uplus	MULTISET MULTIPLICATION → 2A03 \uplus n-ary union operator with dot → 2A40 \uplus intersection with dot
228E	\uplus	MULTISET UNION = z notation bag addition → 2A04 \uplus n-ary union operator with plus

Relations

228F	\square	SQUARE IMAGE OF
2290	\square	SQUARE ORIGINAL OF
2291	\square	SQUARE IMAGE OF OR EQUAL TO
2292	\square	SQUARE ORIGINAL OF OR EQUAL TO

Operators

2293	\sqcap	SQUARE CAP → 2A05 \sqcap n-ary square intersection operator ~ 2293 FE00 \sqcap with serifs
2294	\sqcup	SQUARE CUP ~ 2294 FE00 \sqcup with serifs
2295	\oplus	CIRCLED PLUS = direct sum = vector pointing into page → 2A01 \oplus n-ary circled plus operator → 1F728 \oplus alchemical symbol for verdigris ~ 2295 FE00 \oplus with white rim
2296	\ominus	CIRCLED MINUS = symmetric difference → 29B5 \ominus circle with horizontal bar → 1F714 \ominus alchemical symbol for salt
2297	\otimes	CIRCLED TIMES = tensor product = vector pointing into page → 26D2 \otimes circled crossing lanes → 2A02 \otimes n-ary circled times operator → 2BBE \otimes circled x ~ 2297 FE00 \otimes with white rim

2298	\oslash	CIRCLED DIVISION SLASH
2299	\odot	CIRCLED DOT OPERATOR = direct product = vector pointing out of page → 0298 \odot latin letter bilabial click → 2609 \odot sun → 2A00 \odot n-ary circled dot operator
229A	\odot	CIRCLED RING OPERATOR → 233E \odot apl functional symbol circle jot → 25CE \odot bullseye
229B	\otimes	CIRCLED ASTERISK OPERATOR → 235F \otimes apl functional symbol circle star
229C	\ominus	CIRCLED EQUALS ~ 229C FE00 \ominus with equal sign touching the circle
229D	$\omin�$	CIRCLED DASH
229E	\boxplus	SQUARED PLUS
229F	\boxminus	SQUARED MINUS
22A0	\boxtimes	SQUARED TIMES → 2612 \boxtimes ballot box with x → 26DD \boxtimes squared saltire → 1F771 \boxtimes alchemical symbol for month
22A1	\boxdot	SQUARED DOT OPERATOR → 1F755 \boxdot alchemical symbol for urine
22A2	\dashv	RIGHT TACK = turnstile = proves, implies, yields = reducible
22A3	\dashv	LEFT TACK = reverse turnstile = non-theorem, does not yield

Miscellaneous mathematical symbols

22A4	\top	DOWN TACK = top → 2E06 \top raised interpolation marker → 1F768 \top alchemical symbol for crucible-4
22A5	\perp	UP TACK = base, bottom → 27C2 \perp perpendicular

Relations

22A6	\vdash	ASSERTION = reduces to
22A7	\models	MODELS
22A8	\vDash	TRUE = statement is true, valid = is a tautology = satisfies = results in
22A9	\Vdash	FORCES
22AA	\equiv	TRIPLE VERTICAL BAR RIGHT TURNSTILE
22AB	\equiv	DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE
22AC	\nvdash	DOES NOT PROVE \equiv 22A2 \vdash 0338 $\not\vdash$
22AD	\nVdash	NOT TRUE \equiv 22A8 \vDash 0338 $\not\vDash$
22AE	\nvdash	DOES NOT FORCE \equiv 22A9 \Vdash 0338 $\not\Vdash$
22AF	$\n\equiv$	NEGATED DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE \equiv 22AB \equiv 0338 $\not\equiv$
22B0	\prec	PRECEDES UNDER RELATION → 227A \prec precedes

22B1	\succ	SUCCEEDS UNDER RELATION → 227B \succ succeeds
22B2	\triangleleft	NORMAL SUBGROUP OF → 25C5 \triangleleft white left-pointing pointer
22B3	\triangleright	CONTAINS AS NORMAL SUBGROUP → 25BB \triangleright white right-pointing pointer
22B4	\trianglelefteq	NORMAL SUBGROUP OF OR EQUAL TO
22B5	\trianglerighteq	CONTAINS AS NORMAL SUBGROUP OR EQUAL TO
22B6	\rightsquigarrow	ORIGINAL OF
22B7	\blacktriangleright	IMAGE OF
22B8	\multimap	MULTIMAP
22B9	\dagger	HERMITIAN CONJUGATE MATRIX

Operators

22BA	$\upbar{\top}$	INTERCALATE
22BB	$\underline{\vee}$	XOR → 26BA $\underline{\vee}$ semisextile
22BC	$\bar{\wedge}$	NAND → 2305 $\bar{\wedge}$ projective → 26BB $\bar{\wedge}$ quincunx
22BD	∇	NOR

Miscellaneous mathematical symbols

22BE	\sphericalangle	RIGHT ANGLE WITH ARC
22BF	\triangle	RIGHT TRIANGLE

N-ary operators

22C0	\bigwedge	N-ARY LOGICAL AND • also used to denote the universal quantifier → 2227 \bigwedge logical and
22C1	\bigvee	N-ARY LOGICAL OR • also used to denote the existential quantifier → 2228 \bigvee logical or
22C2	\bigcap	N-ARY INTERSECTION = z notation generalised intersection → 2229 \bigcap intersection
22C3	\bigcup	N-ARY UNION = z notation generalised union → 222A \bigcup union

Operators

22C4	\blacklozenge	DIAMOND OPERATOR → 25C7 \blacklozenge white diamond → 2B29 \blacklozenge black small diamond
22C5	\cdot	DOT OPERATOR → 00B7 \cdot middle dot
22C6	\star	STAR OPERATOR • APL → 066D \star arabic five pointed star → 2605 \star black star → 2B50 \star white medium star
22C7	\ast	DIVISION TIMES

Relation

22C8	\bowtie	BOWTIE → 2445 \bowtie ocr bow tie
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Operators

22C9	\ltimes	LEFT NORMAL FACTOR SEMIDIRECT PRODUCT
22CA	\rtimes	RIGHT NORMAL FACTOR SEMIDIRECT PRODUCT
22CB	\times	LEFT SEMIDIRECT PRODUCT
22CC	\ltimes	RIGHT SEMIDIRECT PRODUCT → 2041 \ltimes caret insertion point

Relation22CD \approx REVERSED TILDE EQUALS**Logical operators**22CE \vee CURLY LOGICAL OR22CF \wedge CURLY LOGICAL AND**Relations**22D0 \subseteq DOUBLE SUBSET22D1 \supseteq DOUBLE SUPerset**Operators**22D2 \cap DOUBLE INTERSECTION22D3 \cup DOUBLE UNION**Relations**22D4 \pitchfork PITCHFORK

= proper intersection

22D5 $\#$ EQUAL AND PARALLEL TO→ 2317 $\#$ viewdata square22D6 \lessdot LESS-THAN WITH DOT22D7 \gtrdot GREATER-THAN WITH DOT22D8 \lll VERY MUCH LESS-THAN22D9 \ggg VERY MUCH GREATER-THAN22DA \lesseqgtr LESS-THAN EQUAL TO OR GREATER-THAN~ 22DA FE00 \lesseqgtr with slanted equal22DB \gtrreqless GREATER-THAN EQUAL TO OR LESS-THAN~ 22DB FE00 \gtrreqless with slanted equal22DC \lesseqgtr EQUAL TO OR LESS-THAN22DD \lesseqgtr EQUAL TO OR GREATER-THAN22DE \lesseqgtr EQUAL TO OR PRECEDES22DF \lesseqgtr EQUAL TO OR SUCCEEDS22E0 \nlessseqgtr DOES NOT PRECEDE OR EQUAL \equiv 227C \leq 0338 $\not\leq$ 22E1 \ngtrreqless DOES NOT SUCCEED OR EQUAL \equiv 227D \geq 0338 $\not\geq$ 22E2 \nlessseqgtr NOT SQUARE IMAGE OF OR EQUAL TO \equiv 2291 \sqsubseteq 0338 $\not\sqsubseteq$ 22E3 \nlessseqgtr NOT SQUARE ORIGINAL OF OR EQUAL TO \equiv 2292 \sqsupseteq 0338 $\not\sqsupseteq$ 22E4 \nlessseqgtr SQUARE IMAGE OF OR NOT EQUAL TO22E5 \nlessseqgtr SQUARE ORIGINAL OF OR NOT EQUAL TO22E6 \nlessseqgtr LESS-THAN BUT NOT EQUIVALENT TO22E7 \nlessseqgtr GREATER-THAN BUT NOT EQUIVALENT TO22E8 \nlessseqgtr PRECEDES BUT NOT EQUIVALENT TO22E9 \nlessseqgtr SUCCEEDS BUT NOT EQUIVALENT TO22EA \nlessseqgtr NOT NORMAL SUBGROUP OF \equiv 22B2 \triangleleft 0338 $\not\triangleleft$ 22EB \nlessseqgtr DOES NOT CONTAIN AS NORMAL SUBGROUP \equiv 22B3 \triangleright 0338 $\not\triangleright$ 22EC \nlessseqgtr NOT NORMAL SUBGROUP OF OR EQUAL TO \equiv 22B4 \triangleleft 0338 $\not\triangleleft$ 22ED \nlessseqgtr DOES NOT CONTAIN AS NORMAL SUBGROUP































OR EQUAL




























































































































































































































































 \equiv 22B5 \triangleright 0338 $\not\triangleright$ 22EE \vdots VERTICAL ELLIPSIS

















































- these four ellipses are used for matrix row/column elision
- 205D \vdots tricolon
- 2026 \dots horizontal ellipsis
- FE19 \vdots presentation form for vertical horizontal ellipsis

















22EF \dots MIDLINE HORIZONTAL ELLIPSIS22F0 \therefore UP RIGHT DIAGONAL ELLIPSIS22F1 \therefore DOWN RIGHT DIAGONAL ELLIPSIS22F2 \E ELEMENT OF WITH LONG HORIZONTAL STROKE22F3 \E ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE22F4 \e SMALL ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE22F5 \E ELEMENT OF WITH DOT ABOVE22F6 \E ELEMENT OF WITH OVERBAR22F7 \e SMALL ELEMENT OF WITH OVERBAR22F8 \E ELEMENT OF WITH UNDERBAR22F9 \E ELEMENT OF WITH TWO HORIZONTAL STROKES22FA \ni CONTAINS WITH LONG HORIZONTAL STROKE22FB \ni CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE22FC \ni SMALL CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE22FD \ni CONTAINS WITH OVERBAR22FE \ni SMALL CONTAINS WITH OVERBAR22FF \E Z NOTATION BAG MEMBERSHIP

Experimental listing














Standardized Variation Sequences	
<i>Experimental listing</i>	
2229	 INTERSECTION <small>2229</small>  with serifs <small>2229 FE00</small>
222A	 UNION <small>222A</small>  with serifs <small>222A FE00</small>
2268	 LESS-THAN BUT NOT EQUAL TO <small>2268</small>  with vertical stroke <small>2268 FE00</small>
2269	 GREATER-THAN BUT NOT EQUAL TO <small>2269</small>  with vertical stroke <small>2269 FE00</small>
2272	 LESS-THAN OR EQUIVALENT TO <small>2272</small>  following the slant of the lower leg <small>2272 FE00</small>
2273	 GREATER-THAN OR EQUIVALENT TO <small>2273</small>  following the slant of the lower leg <small>2273 FE00</small>
228A	 SUBSET OF WITH NOT EQUAL TO <small>228A</small>  with stroke through bottom members <small>228A FE00</small>
228B	 SUPERSET OF WITH NOT EQUAL TO <small>228B</small>  with stroke through bottom members <small>228B FE00</small>
2293	 SQUARE CAP <small>2293</small>  with serifs <small>2293 FE00</small>
2294	 SQUARE CUP <small>2294</small>  with serifs <small>2294 FE00</small>
2295	 CIRCLED PLUS <small>2295</small>  with white rim <small>2295 FE00</small>
2297	 CIRCLED TIMES <small>2297</small>  with white rim <small>2297 FE00</small>
229C	 CIRCLED EQUALS <small>229C</small>  with equal sign touching the circle <small>229C FE00</small>
22DA	 LESS-THAN EQUAL TO OR GREATER-THAN <small>22DA</small>  with slanted equal <small>22DA FE00</small>
22DB	 GREATER-THAN EQUAL TO OR LESS-THAN <small>22DB</small>  with slanted equal <small>22DB FE00</small>

	230	231	232	233	234	235	236	237	238	239	23A	23B	23C	23D	23E	23F
0	 2300	 2310	 2320	 2330	 2340	 2350	 2360	 2370	 2380	 2390	 23A0	 23B0	 23C0	 23D0	 23E0	 23F0
1	 2301	 2311	 2321	 2331	 2341	 2351	 2361	 2371	 2381	 2391	 23A1	 23B1	 23C1	 23D1	 23E1	 23F1
2	 2302	 2312	 2322	 2332	 2342	 2352	 2362	 2372	 2382	 2392	 23A2	 23B2	 23C2	 23D2	 23E2	 23F2
3	 2303	 2313	 2323	 2333	 2343	 2353	 2363	 2373	 2383	 2393	 23A3	 23B3	 23C3	 23D3	 23E3	 23F3
4	 2304	 2314	 2324	 2334	 2344	 2354	 2364	 2374	 2384	 2394	 23A4	 23B4	 23C4	 23D4	 23E4	 23F4
5	 2305	 2315	 2325	 2335	 2345	 2355	 2365	 2375	 2385	 2395	 23A5	 23B5	 23C5	 23D5	 23E5	 23F5
6	 2306	 2316	 2326	 2336	 2346	 2356	 2366	 2376	 2386	 2396	 23A6	 23B6	 23C6	 23D6	 23E6	 23F6
7	 2307	 2317	 2327	 2337	 2347	 2357	 2367	 2377	 2387	 2397	 23A7	 23B7	 23C7	 23D7	 23E7	 23F7
8	 2308	 2318	 2328	 2338	 2348	 2358	 2368	 2378	 2388	 2398	 23A8	 23B8	 23C8	 23D8	 23E8	 23F8
9	 2309	 2319	 2329	 2339	 2349	 2359	 2369	 2379	 2389	 2399	 23A9	 23B9	 23C9	 23D9	 23E9	 23F9
A	 230A	 231A	 232A	 233A	 234A	 235A	 236A	 237A	 238A	 239A	 23AA	 23BA	 23CA	 23DA	 23EA	 23FA
B	 230B	 231B	 232B	 233B	 234B	 235B	 236B	 237B	 238B	 239B	 23AB	 23BB	 23CB	 23DB	 23EB	
C	 230C	 231C	 232C	 233C	 234C	 235C	 236C	 237C	 238C	 239C	 23AC	 23BC	 23CC	 23DC	 23EC	
D	 230D	 231D	 232D	 233D	 234D	 235D	 236D	 237D	 238D	 239D	 23AD	 23BD	 23CD	 23DD	 23ED	
E	 230E	 231E	 232E	 233E	 234E	 235E	 236E	 237E	 238E	 239E	 23AE	 23BE	 23CE	 23DE	 23EE	
F	 230F	 231F	 232F	 233F	 234F	 235F	 236F	 237F	 238F	 239F	 23AF	 23BF	 23CF	 23DF	 23EF	

	27C	27D	27E
0	 27C0	 27D0	 27E0
1	 27C1	 27D1	 27E1
2	 27C2	 27D2	 27E2
3	 27C3	 27D3	 27E3
4	 27C4	 27D4	 27E4
5	 27C5	 27D5	 27E5
6	 27C6	 27D6	 27E6
7	 27C7	 27D7	 27E7
8	 27C8	 27D8	 27E8
9	 27C9	 27D9	 27E9
A	 27CA	 27DA	 27EA
B	 27CB	 27DB	 27EB
C	 27CC	 27DC	 27EC
D	 27CD	 27DD	 27ED
E	 27CE	 27DE	 27EE
F	 27CF	 27DF	 27EF





















	27F
0	 27F0
1	 27F1
2	 27F2
3	 27F3
4	 27F4
5	 27F5
6	 27F6
7	 27F7
8	 27F8
9	 27F9
A	 27FA
B	 27FB
C	 27FC
D	 27FD
E	 27FE
F	 27FF
































































































































Arrows

































































































































27F0		UPWARDS QUADRUPLE ARROW → 290A  upwards triple arrow → 2B45  leftwards quadruple arrow
27F1		DOWNWARDS QUADRUPLE ARROW → 290B  downwards triple arrow
27F2		ANTICLOCKWISE GAPPED CIRCLE ARROW → 21BA  anticlockwise open circle arrow → 2940  anticlockwise closed circle arrow
27F3		CLOCKWISE GAPPED CIRCLE ARROW → 21BB  clockwise open circle arrow → 2941  clockwise closed circle arrow
27F4		RIGHT ARROW WITH CIRCLED PLUS → 2B32  left arrow with circled plus




























































































































































































































































Long arrows

The long arrows are used for mapping whereas the short forms would be used in limits. They are also needed for MathML to complete mapping to the AMSA sets.

27F5		LONG LEFTWARDS ARROW → 2190  leftwards arrow
27F6		LONG RIGHTWARDS ARROW → 2192  rightwards arrow
27F7		LONG LEFT RIGHT ARROW → 2194  left right arrow
27F8		LONG LEFTWARDS DOUBLE ARROW → 21D0  leftwards double arrow
27F9		LONG RIGHTWARDS DOUBLE ARROW → 21D2  rightwards double arrow
27FA		LONG LEFT RIGHT DOUBLE ARROW → 21D4  left right double arrow
27FB		LONG LEFTWARDS ARROW FROM BAR = maps from → 21A4  leftwards arrow from bar
27FC		LONG RIGHTWARDS ARROW FROM BAR = maps to → 21A6  rightwards arrow from bar
27FD		LONG LEFTWARDS DOUBLE ARROW FROM BAR → 2906  leftwards double arrow from bar
27FE		LONG RIGHTWARDS DOUBLE ARROW FROM BAR → 2907  rightwards double arrow from bar
27FF		LONG RIGHTWARDS SQUIGGLE ARROW → 21DD  rightwards squiggle arrow → 2B33  long leftwards squiggle arrow

	290	291	292	293	294	295	296	297
0	 2900	 2910	 2920	 2930	 2940	 2950	 2960	 2970
1	 2901	 2911	 2921	 2931	 2941	 2951	 2961	 2971
2	 2902	 2912	 2922	 2932	 2942	 2952	 2962	 2972
3	 2903	 2913	 2923	 2933	 2943	 2953	 2963	 2973
4	 2904	 2914	 2924	 2934	 2944	 2954	 2964	 2974
5	 2905	 2915	 2925	 2935	 2945	 2955	 2965	 2975
6	 2906	 2916	 2926	 2936	 2946	 2956	 2966	 2976
7	 2907	 2917	 2927	 2937	 2947	 2957	 2967	 2977
8	 2908	 2918	 2928	 2938	 2948	 2958	 2968	 2978
9	 2909	 2919	 2929	 2939	 2949	 2959	 2969	 2979
A	 290A	 291A	 292A	 293A	 294A	 295A	 296A	 297A
B	 290B	 291B	 292B	 293B	 294B	 295B	 296B	 297B
C	 290C	 291C	 292C	 293C	 294C	 295C	 296C	 297C
D	 290D	 291D	 292D	 293D	 294D	 295D	 296D	 297D
E	 290E	 291E	 292E	 293E	 294E	 295E	 296E	 297E
F	 290F	 291F	 292F	 293F	 294F	 295F	 296F	 297F

	298	299	29A	29B	29C	29D	29E	29F
0	 2980	 2990	 29A0	 29B0	 29C0	 29D0	 29E0	 29F0
1	 2981	 2991	 29A1	 29B1	 29C1	 29D1	 29E1	 29F1
2	 2982	 2992	 29A2	 29B2	 29C2	 29D2	 29E2	 29F2
3	 2983	 2993	 29A3	 29B3	 29C3	 29D3	 29E3	 29F3
4	 2984	 2994	 29A4	 29B4	 29C4	 29D4	 29E4	 29F4
5	 2985	 2995	 29A5	 29B5	 29C5	 29D5	 29E5	 29F5
6	 2986	 2996	 29A6	 29B6	 29C6	 29D6	 29E6	 29F6
7	 2987	 2997	 29A7	 29B7	 29C7	 29D7	 29E7	 29F7
8	 2988	 2998	 29A8	 29B8	 29C8	 29D8	 29E8	 29F8
9	 2989	 2999	 29A9	 29B9	 29C9	 29D9	 29E9	 29F9
A	 298A	 299A	 29AA	 29BA	 29CA	 29DA	 29EA	 29FA
B	 298B	 299B	 29AB	 29BB	 29CB	 29DB	 29EB	 29FB
C	 298C	 299C	 29AC	 29BC	 29CC	 29DC	 29EC	 29FC
D	 298D	 299D	 29AD	 29BD	 29CD	 29DD	 29ED	 29FD
E	 298E	 299E	 29AE	 29BE	 29CE	 29DE	 29EE	 29FE
F	 298F	 299F	 29AF	 29BF	 29CF	 29DF	 29EF	 29FF

	2A0	2A1	2A2	2A3	2A4	2A5	2A6	2A7	2A8	2A9	2AA	2AB	2AC	2AD	2AE	2AF
0	 2A00	 2A10	 2A20	 2A30	 2A40	 2A50	 2A60	 2A70	 2A80	 2A90	 2AA0	 2AB0	 2AC0	 2AD0	 2AE0	 2AF0
1	 2A01	 2A11	 2A21	 2A31	 2A41	 2A51	 2A61	 2A71	 2A81	 2A91	 2AA1	 2AB1	 2AC1	 2AD1	 2AE1	 2AF1
2	 2A02	 2A12	 2A22	 2A32	 2A42	 2A52	 2A62	 2A72	 2A82	 2A92	 2AA2	 2AB2	 2AC2	 2AD2	 2AE2	 2AF2
3	 2A03	 2A13	 2A23	 2A33	 2A43	 2A53	 2A63	 2A73	 2A83	 2A93	 2AA3	 2AB3	 2AC3	 2AD3	 2AE3	 2AF3
4	 2A04	 2A14	 2A24	 2A34	 2A44	 2A54	 2A64	 2A74	 2A84	 2A94	 2AA4	 2AB4	 2AC4	 2AD4	 2AE4	 2AF4
5	 2A05	 2A15	 2A25	 2A35	 2A45	 2A55	 2A65	 2A75	 2A85	 2A95	 2AA5	 2AB5	 2AC5	 2AD5	 2AE5	 2AF5
6	 2A06	 2A16	 2A26	 2A36	 2A46	 2A56	 2A66	 2A76	 2A86	 2A96	 2AA6	 2AB6	 2AC6	 2AD6	 2AE6	 2AF6
7	 2A07	 2A17	 2A27	 2A37	 2A47	 2A57	 2A67	 2A77	 2A87	 2A97	 2AA7	 2AB7	 2AC7	 2AD7	 2AE7	 2AF7
8	 2A08	 2A18	 2A28	 2A38	 2A48	 2A58	 2A68	 2A78	 2A88	 2A98	 2AA8	 2AB8	 2AC8	 2AD8	 2AE8	 2AF8
9	 2A09	 2A19	 2A29	 2A39	 2A49	 2A59	 2A69	 2A79	 2A89	 2A99	 2AA9	 2AB9	 2AC9	 2AD9	 2AE9	 2AF9
A	 2A0A	 2A1A	 2A2A	 2A3A	 2A4A	 2A5A	 2A6A	 2A7A	 2A8A	 2A9A	 2AA	 2ABA	 2ACA	 2ADA	 2AEA	 2AFA
B	 2A0B	 2A1B	 2A2B	 2A3B	 2A4B	 2A5B	 2A6B	 2A7B	 2A8B	 2A9B	 2AAB	 2ABB	 2ACB	 2ADB	 2AEB	 2AFB
C	 2A0C	 2A1C	 2A2C	 2A3C	 2A4C	 2A5C	 2A6C	 2A7C	 2A8C	 2A9C	 2AAC	 2ABC	 2ACC	 2ADC	 2AEC	 2AFC
D	 2A0D	 2A1D	 2A2D	 2A3D	 2A4D	 2A5D	 2A6D	 2A7D	 2A8D	 2A9D	 2AAD	 2ABD	 2ACD	 2ADD	 2AED	 2AFD
E	 2A0E	 2A1E	 2A2E	 2A3E	 2A4E	 2A5E	 2A6E	 2A7E	 2A8E	 2A9E	 2AAE	 2ABE	 2ACE	 2ADE	 2AEE	 2AFE
F	 2A0F	 2A1F	 2A2F	 2A3F	 2A4F	 2A5F	 2A6F	 2A7F	 2A8F	 2A9F	 2AAF	 2ABF	 2ACF	 2ADF	 2AEF	 2AFF

N-ary operators

2A00	\odot	N-ARY CIRCLED DOT OPERATOR → 2299 \odot circled dot operator → 25C9 \odot fisheye
2A01	\oplus	N-ARY CIRCLED PLUS OPERATOR → 2295 \oplus circled plus
2A02	\otimes	N-ARY CIRCLED TIMES OPERATOR → 2297 \otimes circled times → 2B59 \otimes heavy circled saltire
2A03	$\dot{\cup}$	N-ARY UNION OPERATOR WITH DOT
2A04	$\dot{\cup}$	N-ARY UNION OPERATOR WITH PLUS → 228E $\dot{\cup}$ multiset union
2A05	\sqcap	N-ARY SQUARE INTERSECTION OPERATOR → 2293 \sqcap square cap
2A06	\sqcup	N-ARY SQUARE UNION OPERATOR → 2294 \sqcup square cup
2A07	\pitchfork	TWO LOGICAL AND OPERATOR = merge → 2A55 \pitchfork two intersecting logical and
2A08	\pitchfork	TWO LOGICAL OR OPERATOR → 2A56 \pitchfork two intersecting logical or
2A09	\times	N-ARY TIMES OPERATOR → 00D7 \times multiplication sign

Summations and integrals

2A0A	\sum_2	MODULO TWO SUM → 2211 \sum n-ary summation
2A0B	\int	SUMMATION WITH INTEGRAL
2A0C	\iiint	QUADRUPLE INTEGRAL OPERATOR → 222D \iiint triple integral \approx 222B \int 222B \int 222B \int 222B \int
2A0D	\int	FINITE PART INTEGRAL
2A0E	\int	INTEGRAL WITH DOUBLE STROKE
2A0F	\int	INTEGRAL AVERAGE WITH SLASH
2A10	\int	CIRCULATION FUNCTION
2A11	\int	ANTICLOCKWISE INTEGRATION
2A12	\int	LINE INTEGRATION WITH RECTANGULAR PATH AROUND POLE
2A13	\int	LINE INTEGRATION WITH SEMICIRCULAR PATH AROUND POLE
2A14	\int	LINE INTEGRATION NOT INCLUDING THE POLE
2A15	\oint	INTEGRAL AROUND A POINT OPERATOR → 222E \oint contour integral
2A16	\int	QUATERNION INTEGRAL OPERATOR
2A17	\int	INTEGRAL WITH LEFTWARDS ARROW WITH HOOK
2A18	\int	INTEGRAL WITH TIMES SIGN
2A19	\int	INTEGRAL WITH INTERSECTION
2A1A	\int	INTEGRAL WITH UNION
2A1B	\int	INTEGRAL WITH OVERBAR = upper integral
2A1C	\int	INTEGRAL WITH UNDERBAR = lower integral

Miscellaneous large operators

2A1D	\bowtie	JOIN = large bowtie • relational database theory → 22C8 \bowtie bowtie → 27D7 \bowtie full outer join
2A1E	\triangleleft	LARGE LEFT TRIANGLE OPERATOR • relational database theory → 25C1 \triangleleft white left-pointing triangle

2A1F	\S	Z NOTATION SCHEMA COMPOSITION → 2A3E \S z notation relational composition
2A20	\gg	Z NOTATION SCHEMA PIPING → 226B \gg much greater-than
2A21	\uparrow	Z NOTATION SCHEMA PROJECTION → 21BE \uparrow upwards harpoon with barb rightwards

Plus and minus sign operators

2A22	\ddagger	PLUS SIGN WITH SMALL CIRCLE ABOVE
2A23	\dagger	PLUS SIGN WITH CIRCUMFLEX ACCENT ABOVE
2A24	\mp	PLUS SIGN WITH TILDE ABOVE = positive difference or sum
2A25	\dagger	PLUS SIGN WITH DOT BELOW → 2214 \dagger dot plus
2A26	\pm	PLUS SIGN WITH TILDE BELOW = sum or positive difference
2A27	\ddagger	PLUS SIGN WITH SUBSCRIPT TWO = nim-addition
2A28	\blacktriangle	PLUS SIGN WITH BLACK TRIANGLE
2A29	\dagger	MINUS SIGN WITH COMMA ABOVE
2A2A	\ddagger	MINUS SIGN WITH DOT BELOW → 2238 \ddagger dot minus
2A2B	\ddagger	MINUS SIGN WITH FALLING DOTS
2A2C	\ddagger	MINUS SIGN WITH RISING DOTS
2A2D	\oplus	PLUS SIGN IN LEFT HALF CIRCLE
2A2E	\ominus	PLUS SIGN IN RIGHT HALF CIRCLE

Multiplication and division sign operators

2A2F	\times	VECTOR OR CROSS PRODUCT → 00D7 \times multiplication sign
2A30	\times	MULTIPLICATION SIGN WITH DOT ABOVE
2A31	\times	MULTIPLICATION SIGN WITH UNDERBAR
2A32	\times	SEMIDIRECT PRODUCT WITH BOTTOM CLOSED
2A33	\ast	SMASH PRODUCT
2A34	\otimes	MULTIPLICATION SIGN IN LEFT HALF CIRCLE
2A35	\otimes	MULTIPLICATION SIGN IN RIGHT HALF CIRCLE
2A36	\otimes	CIRCLED MULTIPLICATION SIGN WITH CIRCUMFLEX ACCENT
2A37	\otimes	MULTIPLICATION SIGN IN DOUBLE CIRCLE
2A38	\oslash	CIRCLED DIVISION SIGN

Miscellaneous mathematical operators

2A39	\triangle	PLUS SIGN IN TRIANGLE
2A3A	\triangle	MINUS SIGN IN TRIANGLE
2A3B	\triangle	MULTIPLICATION SIGN IN TRIANGLE
2A3C	\lrcorner	INTERIOR PRODUCT → 230B \lrcorner right floor ~ 2A3C FE00 \lrcorner tall variant with narrow foot
2A3D	\llcorner	RIGHTHAND INTERIOR PRODUCT → 230A \llcorner left floor → 2319 \llcorner turned not sign ~ 2A3D FE00 \llcorner tall variant with narrow foot
2A3E	\S	Z NOTATION RELATIONAL COMPOSITION → 2A1F \S z notation schema composition
2A3F	\amalg	AMALGAMATION OR COPRODUCT → 2210 \amalg n-ary coproduct

Intersections and unions

2A40	\cap	INTERSECTION WITH DOT → 2227 \cap logical and → 27D1 \cap and with dot
2A41	$\dot{\cup}$	UNION WITH MINUS SIGN = z notation bag subtraction → 228E $\dot{\cup}$ multiset union

2A42	$\bar{\cup}$	UNION WITH OVERBAR
2A43	$\bar{\cap}$	INTERSECTION WITH OVERBAR
2A44	$\bar{\cap}$	INTERSECTION WITH LOGICAL AND
2A45	$\bar{\cup}$	UNION WITH LOGICAL OR
2A46	$\bar{\cup} \bar{\cap}$	UNION ABOVE INTERSECTION
2A47	$\bar{\cap} \bar{\cup}$	INTERSECTION ABOVE UNION
2A48	$\bar{\cup} \bar{\cap}$	UNION ABOVE BAR ABOVE INTERSECTION
2A49	$\bar{\cap} \bar{\cup}$	INTERSECTION ABOVE BAR ABOVE UNION
2A4A	$\bar{\cup} \bar{\cap}$	UNION BESIDE AND JOINED WITH UNION
2A4B	$\bar{\cap} \bar{\cup}$	INTERSECTION BESIDE AND JOINED WITH INTERSECTION
2A4C	$\bar{\cup}$	CLOSED UNION WITH SERIFS → 222A $\bar{\cup}$ union
2A4D	$\bar{\cap}$	CLOSED INTERSECTION WITH SERIFS → 2229 $\bar{\cap}$ intersection
2A4E	$\bar{\square}$	DOUBLE SQUARE INTERSECTION
2A4F	$\bar{\square}$	DOUBLE SQUARE UNION
2A50	$\bar{\cup}$	CLOSED UNION WITH SERIFS AND SMASH PRODUCT
Logical ands and ors		
2A51	\wedge	LOGICAL AND WITH DOT ABOVE
2A52	\vee	LOGICAL OR WITH DOT ABOVE
2A53	\wedge	DOUBLE LOGICAL AND
2A54	\vee	DOUBLE LOGICAL OR
2A55	\wedge	TWO INTERSECTING LOGICAL AND → 2A07 \wedge two logical and operator
2A56	\vee	TWO INTERSECTING LOGICAL OR → 2A08 \vee two logical or operator
2A57	\sloper	SLOPING LARGE OR
2A58	\sloper	SLOPING LARGE AND
2A59	\times	LOGICAL OR OVERLAPPING LOGICAL AND
2A5A	\wedge	LOGICAL AND WITH MIDDLE STEM
2A5B	\vee	LOGICAL OR WITH MIDDLE STEM
2A5C	\wedge	LOGICAL AND WITH HORIZONTAL DASH
2A5D	\vee	LOGICAL OR WITH HORIZONTAL DASH
2A5E	$\bar{\wedge}$	LOGICAL AND WITH DOUBLE OVERBAR → 2306 $\bar{\wedge}$ perspective
2A5F	$\underline{\wedge}$	LOGICAL AND WITH UNDERBAR
2A60	$\underline{\wedge}$	LOGICAL AND WITH DOUBLE UNDERBAR → 2259 $\underline{\wedge}$ estimates
2A61	\sloper	SMALL VEE WITH UNDERBAR → 225A \sloper equiangular to
2A62	$\bar{\vee}$	LOGICAL OR WITH DOUBLE OVERBAR
2A63	$\underline{\vee}$	LOGICAL OR WITH DOUBLE UNDERBAR → 225A $\underline{\vee}$ equiangular to
Miscellaneous mathematical operators		
2A64	\triangleleft	Z NOTATION DOMAIN ANTIRESTRICTION
2A65	\triangleleft	Z NOTATION RANGE ANTIRESTRICTION → 2332 \triangleleft conical taper
Relational operators		
2A66	\doteq	EQUALS SIGN WITH DOT BELOW → 2250 \doteq approaches the limit
2A67	\doteq	IDENTICAL WITH DOT ABOVE
2A68	$\#$	TRIPLE HORIZONTAL BAR WITH DOUBLE VERTICAL STROKE = identical and parallel to → 22D5 $\#$ equal and parallel to → 29E5 $\#$ identical to and slanted parallel
2A69	$\#$	TRIPLE HORIZONTAL BAR WITH TRIPLE VERTICAL STROKE
2A6A	\sim	TILDE OPERATOR WITH DOT ABOVE
2A6B	\sim	TILDE OPERATOR WITH RISING DOTS → 223B \sim homothetic
2A6C	\approx	SIMILAR MINUS SIMILAR
2A6D	\doteq	CONGRUENT WITH DOT ABOVE → 2245 \doteq approximately equal to
2A6E	\doteq	EQUALS WITH ASTERISK → 225B \doteq star equals
2A6F	\approx	ALMOST EQUAL TO WITH CIRCUMFLEX ACCENT
2A70	\doteq	APPROXIMATELY EQUAL OR EQUAL TO
2A71	\doteq	EQUALS SIGN ABOVE PLUS SIGN • black stands slightly better (chess notation)
2A72	\doteq	PLUS SIGN ABOVE EQUALS SIGN • white stands slightly better (chess notation)
2A73	\doteq	EQUALS SIGN ABOVE TILDE OPERATOR
2A74	\doteq	DOUBLE COLON EQUAL \approx 003A : 003A : 003D =
2A75	\doteq	TWO CONSECUTIVE EQUALS SIGNS \approx 003D = 003D =
2A76	\doteq	THREE CONSECUTIVE EQUALS SIGNS \approx 003D = 003D = 003D =
2A77	\doteq	EQUALS SIGN WITH TWO DOTS ABOVE AND TWO DOTS BELOW
2A78	\doteq	EQUIVALENT WITH FOUR DOTS ABOVE
2A79	\triangleleft	LESS-THAN WITH CIRCLE INSIDE
2A7A	\triangleright	GREATER-THAN WITH CIRCLE INSIDE
2A7B	\triangleleft	LESS-THAN WITH QUESTION MARK ABOVE
2A7C	\triangleright	GREATER-THAN WITH QUESTION MARK ABOVE
2A7D	\triangleleft	LESS-THAN OR SLANTED EQUAL TO → 2264 \triangleleft less-than or equal to
2A7E	\triangleright	GREATER-THAN OR SLANTED EQUAL TO → 2265 \triangleright greater-than or equal to
2A7F	\triangleleft	LESS-THAN OR SLANTED EQUAL TO WITH DOT INSIDE
2A80	\triangleright	GREATER-THAN OR SLANTED EQUAL TO WITH DOT INSIDE
2A81	\triangleleft	LESS-THAN OR SLANTED EQUAL TO WITH DOT ABOVE
2A82	\triangleright	GREATER-THAN OR SLANTED EQUAL TO WITH DOT ABOVE
2A83	\triangleleft	LESS-THAN OR SLANTED EQUAL TO WITH DOT ABOVE RIGHT
2A84	\triangleright	GREATER-THAN OR SLANTED EQUAL TO WITH DOT ABOVE LEFT
2A85	\triangleleft	LESS-THAN OR APPROXIMATE
2A86	\triangleright	GREATER-THAN OR APPROXIMATE
2A87	\triangleleft	LESS-THAN AND SINGLE-LINE NOT EQUAL TO → 2268 \triangleleft less-than but not equal to
2A88	\triangleright	GREATER-THAN AND SINGLE-LINE NOT EQUAL TO → 2269 \triangleright greater-than but not equal to
2A89	\triangleleft	LESS-THAN AND NOT APPROXIMATE
2A8A	\triangleright	GREATER-THAN AND NOT APPROXIMATE
2A8B	\doteq	LESS-THAN ABOVE DOUBLE-LINE EQUAL ABOVE GREATER-THAN → 22DA \doteq less-than equal to or greater-than
2A8C	\doteq	GREATER-THAN ABOVE DOUBLE-LINE EQUAL ABOVE LESS-THAN → 22DB \doteq greater-than equal to or less-than
2A8D	\doteq	LESS-THAN ABOVE SIMILAR OR EQUAL
2A8E	\doteq	GREATER-THAN ABOVE SIMILAR OR EQUAL
2A8F	\doteq	LESS-THAN ABOVE SIMILAR ABOVE GREATER-THAN

2A90	\gtrsim	GREATER-THAN ABOVE SIMILAR ABOVE LESS-THAN
2A91	\gtrsim	LESS-THAN ABOVE GREATER-THAN ABOVE DOUBLE-LINE EQUAL
2A92	\gtrsim	GREATER-THAN ABOVE LESS-THAN ABOVE DOUBLE-LINE EQUAL
2A93	\gtrsim	LESS-THAN ABOVE SLANTED EQUAL ABOVE GREATER-THAN ABOVE SLANTED EQUAL
2A94	\gtrsim	GREATER-THAN ABOVE SLANTED EQUAL ABOVE LESS-THAN ABOVE SLANTED EQUAL
2A95	\lessgtr	SLANTED EQUAL TO OR LESS-THAN → 22DC \lessgtr equal to or less-than
2A96	\gtrsim	SLANTED EQUAL TO OR GREATER-THAN → 22DD \gtrsim equal to or greater-than
2A97	\lessgtr	SLANTED EQUAL TO OR LESS-THAN WITH DOT INSIDE
2A98	\gtrsim	SLANTED EQUAL TO OR GREATER-THAN WITH DOT INSIDE
2A99	\lessgtr	DOUBLE-LINE EQUAL TO OR LESS-THAN → 22DC \lessgtr equal to or less-than
2A9A	\gtrsim	DOUBLE-LINE EQUAL TO OR GREATER-THAN → 22DD \gtrsim equal to or greater-than
2A9B	\lessgtr	DOUBLE-LINE SLANTED EQUAL TO OR LESS-THAN
2A9C	\lessgtr	DOUBLE-LINE SLANTED EQUAL TO OR GREATER-THAN
2A9D	\lessgtr	SIMILAR OR LESS-THAN ~ 2A9D FE00 \lessgtr with similar following the slant of the upper leg
2A9E	\lessgtr	SIMILAR OR GREATER-THAN ~ 2A9E FE00 \lessgtr with similar following the slant of the upper leg
2A9F	\lessgtr	SIMILAR ABOVE LESS-THAN ABOVE EQUALS SIGN
2AA0	\lessgtr	SIMILAR ABOVE GREATER-THAN ABOVE EQUALS SIGN
2AA1	\lll	DOUBLE NESTED LESS-THAN = absolute continuity → 226A \lll much less-than
2AA2	\ggg	DOUBLE NESTED GREATER-THAN → 226B \ggg much greater-than
2AA3	\lessgtr	DOUBLE NESTED LESS-THAN WITH UNDERBAR
2AA4	\times	GREATER-THAN OVERLAPPING LESS-THAN
2AA5	\times	GREATER-THAN BESIDE LESS-THAN
2AA6	\triangleleft	LESS-THAN CLOSED BY CURVE
2AA7	\triangleright	GREATER-THAN CLOSED BY CURVE
2AA8	\triangleleft	LESS-THAN CLOSED BY CURVE ABOVE SLANTED EQUAL
2AA9	\triangleright	GREATER-THAN CLOSED BY CURVE ABOVE SLANTED EQUAL
2AAA	\ll	SMALLER THAN
2AAB	\gg	LARGER THAN
2AAC	\leq	SMALLER THAN OR EQUAL TO ~ 2AAC FE00 \leq with slanted equal
2AAD	\geq	LARGER THAN OR EQUAL TO ~ 2AAD FE00 \geq with slanted equal
2AAE	\equiv	EQUALS SIGN WITH BUMPY ABOVE → 224F \equiv difference between
2AAF	\preceq	PRECEDES ABOVE SINGLE-LINE EQUALS SIGN → 227C \preceq precedes or equal to
2AB0	\succeq	SUCCEEDS ABOVE SINGLE-LINE EQUALS SIGN → 227D \succeq succeeds or equal to
2AB1	\preceq	PRECEDES ABOVE SINGLE-LINE NOT EQUAL TO
2AB2	\succeq	SUCCEEDS ABOVE SINGLE-LINE NOT EQUAL TO

2AB3	\preceq	PRECEDES ABOVE EQUALS SIGN
2AB4	\succeq	SUCCEEDS ABOVE EQUALS SIGN
2AB5	\neq	PRECEDES ABOVE NOT EQUAL TO
2AB6	\neq	SUCCEEDS ABOVE NOT EQUAL TO
2AB7	\approx	PRECEDES ABOVE ALMOST EQUAL TO
2AB8	\approx	SUCCEEDS ABOVE ALMOST EQUAL TO
2AB9	\approx	PRECEDES ABOVE NOT ALMOST EQUAL TO
2ABA	\approx	SUCCEEDS ABOVE NOT ALMOST EQUAL TO
2ABB	\preceq	DOUBLE PRECEDES
2ABC	\succeq	DOUBLE SUCCEEDS

Subset and superset relations

2ABD	\subset	SUBSET WITH DOT
2ABE	\supset	SUPERSET WITH DOT
2ABF	\subset	SUBSET WITH PLUS SIGN BELOW
2AC0	\supset	SUPERSET WITH PLUS SIGN BELOW
2AC1	\subset	SUBSET WITH MULTIPLICATION SIGN BELOW
2AC2	\supset	SUPERSET WITH MULTIPLICATION SIGN BELOW
2AC3	\subset	SUBSET OF OR EQUAL TO WITH DOT ABOVE
2AC4	\supset	SUPERSET OF OR EQUAL TO WITH DOT ABOVE
2AC5	\subset	SUBSET OF ABOVE EQUALS SIGN
2AC6	\supset	SUPERSET OF ABOVE EQUALS SIGN
2AC7	\subset	SUBSET OF ABOVE TILDE OPERATOR
2AC8	\supset	SUPERSET OF ABOVE TILDE OPERATOR
2AC9	\subset	SUBSET OF ABOVE ALMOST EQUAL TO
2ACA	\supset	SUPERSET OF ABOVE ALMOST EQUAL TO
2ACB	\subset	SUBSET OF ABOVE NOT EQUAL TO ~ 2ACB FE00 \subset with stroke through bottom members
2ACC	\supset	SUPERSET OF ABOVE NOT EQUAL TO ~ 2ACC FE00 \supset with stroke through bottom members
2ACD	\sqsubset	SQUARE LEFT OPEN BOX OPERATOR
2ACE	\sqsupset	SQUARE RIGHT OPEN BOX OPERATOR
2ACF	\square	CLOSED SUBSET → 2282 \square subset of
2AD0	\supset	CLOSED SUPERSET → 2283 \supset superset of
2AD1	\sqsubset	CLOSED SUBSET OR EQUAL TO
2AD2	\sqsupset	CLOSED SUPERSET OR EQUAL TO
2AD3	\supset	SUBSET ABOVE SUPERSET
2AD4	\supset	SUPERSET ABOVE SUBSET
2AD5	\supset	SUBSET ABOVE SUBSET
2AD6	\supset	SUPERSET ABOVE SUPERSET
2AD7	\supset	SUPERSET BESIDE SUBSET
2AD8	\supset	SUPERSET BESIDE AND JOINED BY DASH WITH SUBSET

Forks

2AD9	\ni	ELEMENT OF OPENING DOWNWARDS → 2208 \ni element of → 27D2 \ni element of opening upwards
2ADA	\pitchfork	PITCHFORK WITH TEE TOP → 22D4 \pitchfork pitchfork
2ADB	\pitchfork	TRANSVERSAL INTERSECTION → 22D4 \pitchfork pitchfork
2ADC	\nexists	FORKING = not independent • an equational logic symbol, not a computing science symbol • non-independence (original concept) is related to forking \equiv 2ADD \nexists 0338 \nexists

2ADD \Downarrow NONFORKING
 = independent
 • an equational logic symbol, not a computing science symbol
 • independence (original concept) is related to non-forking

Tacks and turnstiles

2ADE \dashv SHORT LEFT TACK
 → 22A3 \dashv left tack

2ADF \dashv SHORT DOWN TACK
 → 22A4 \dashv down tack

2AE0 \dashv SHORT UP TACK
 → 22A5 \dashv up tack

2AE1 \perp PERPENDICULAR WITH S

2AE2 \vDash VERTICAL BAR TRIPLE RIGHT TURNSTILE
 = ordinarily satisfies

2AE3 \dashv DOUBLE VERTICAL BAR LEFT TURNSTILE
 → 22A9 \dashv forces

2AE4 \vDash VERTICAL BAR DOUBLE LEFT TURNSTILE
 → 22A8 \vDash true

2AE5 \vDash DOUBLE VERTICAL BAR DOUBLE LEFT TURNSTILE

2AE6 \dashv LONG DASH FROM LEFT MEMBER OF DOUBLE VERTICAL
 → 22A9 \dashv forces

2AE7 \dashv SHORT DOWN TACK WITH OVERBAR
 → 22A4 \dashv down tack
 → 2351 \dashv apl functional symbol up tack overbar

2AE8 \dashv SHORT UP TACK WITH UNDERBAR
 → 22A5 \dashv up tack
 → 234A \dashv apl functional symbol down tack underbar

2AE9 \dashv SHORT UP TACK ABOVE SHORT DOWN TACK

2AEA \dashv DOUBLE DOWN TACK

2AEB \dashv DOUBLE UP TACK
 = independence
 • probability theory

2AEC \dashv DOUBLE STROKE NOT SIGN
 → 00AC \dashv not sign

2AED \dashv REVERSED DOUBLE STROKE NOT SIGN
 → 2310 \dashv reversed not sign

Vertical line operators

2AEE \dashv DOES NOT DIVIDE WITH REVERSED NEGATION SLASH
 → 2224 \dashv does not divide

2AEF \dashv VERTICAL LINE WITH CIRCLE ABOVE

2AF0 \dashv VERTICAL LINE WITH CIRCLE BELOW

2AF1 \dashv DOWN TACK WITH CIRCLE BELOW
 = necessarily satisfies
 → 27DF \dashv up tack with circle above

2AF2 \dashv PARALLEL WITH HORIZONTAL STROKE
 → 2226 \dashv not parallel to
 → 27CA \dashv vertical bar with horizontal stroke

2AF3 \dashv PARALLEL WITH TILDE OPERATOR

2AF4 \dashv TRIPLE VERTICAL BAR BINARY RELATION
 = interleave
 → 2980 \dashv triple vertical bar delimiter

2AF5 \dashv TRIPLE VERTICAL BAR WITH HORIZONTAL STROKE
 → 27CA \dashv vertical bar with horizontal stroke

Miscellaneous mathematical operator

2AF6 \dashv TRIPLE COLON OPERATOR
 • logic
 → 205D \dashv tricolon
 → 22EE \dashv vertical ellipsis

Relations

2AF7 \dashv TRIPLE NESTED LESS-THAN
 → 22D8 \dashv very much less-than

2AF8 \dashv TRIPLE NESTED GREATER-THAN
 → 22D9 \dashv very much greater-than

2AF9 \dashv DOUBLE-LINE SLANTED LESS-THAN OR EQUAL TO
 → 2266 \dashv less-than over equal to

2AFA \dashv DOUBLE-LINE SLANTED GREATER-THAN OR EQUAL TO
 → 2267 \dashv greater-than over equal to

2AFB \dashv TRIPLE SOLIDUS BINARY RELATION
 → 2AF4 \dashv triple vertical bar binary relation

















Operators















































































































































































































2AFC \dashv LARGE TRIPLE VERTICAL BAR OPERATOR
 • often n-ary
 → 2AF4 \dashv triple vertical bar binary relation
 → 2980 \dashv triple vertical bar delimiter

2AFD \dashv DOUBLE SOLIDUS OPERATOR
 → 2225 \dashv parallel to

2AFE \dashv WHITE VERTICAL BAR
 = Dijkstra choice

2AFF \dashv N-ARY WHITE VERTICAL BAR
 = n-ary Dijkstra choice

Standardized Variation Sequences	
2A3C	 INTERIOR PRODUCT <small>2A3C</small>  tall variant with narrow foot <small>2A3C FE00</small>
2A3D	 RIGHTHAND INTERIOR PRODUCT <small>2A3D</small>  tall variant with narrow foot <small>2A3D FE00</small>
2A9D	 SIMILAR OR LESS-THAN <small>2A9D</small>  with similar following the slant of the upper leg <small>2A9D FE00</small>
2A9E	 SIMILAR OR GREATER-THAN <small>2A9E</small>  with similar following the slant of the upper leg <small>2A9E FE00</small>
2AAC	 SMALLER THAN OR EQUAL TO <small>2AAC</small>  with slanted equal <small>2AAC FE00</small>
2AAD	 LARGER THAN OR EQUAL TO <small>2AAD</small>  with slanted equal <small>2AAD FE00</small>
2ACB	 SUBSET OF ABOVE NOT EQUAL TO <small>2ACB</small>  with stroke through bottom members <small>2ACB FE00</small>
2ACC	 SUPERSET OF ABOVE NOT EQUAL TO <small>2ACC</small>  with stroke through bottom members <small>2ACC FE00</small>

	2B0	2B1	2B2	2B3	2B4	2B5	2B6	2B7	2B8	2B9	2BA	2BB	2BC	2BD	2BE	2BF
0	 2B00	 2B10	 2B20	 2B30	 2B40	 2B50	 2B60	 2B70	 2B80	 2B90	 2BA0	 2BB0	 2BC0	 2BD0		
1	 2B01	 2B11	 2B21	 2B31	 2B41	 2B51	 2B61	 2B71	 2B81	 2B91	 2BA1	 2BB1	 2BC1	 2BD1		
2	 2B02	 2B12	 2B22	 2B32	 2B42	 2B52	 2B62	 2B72	 2B82	 2B92	 2BA2	 2BB2	 2BC2			
3	 2B03	 2B13	 2B23	 2B33	 2B43	 2B53	 2B63	 2B73	 2B83	 2B93	 2BA3	 2BB3	 2BC3			
4	 2B04	 2B14	 2B24	 2B34	 2B44	 2B54	 2B64		 2B84	 2B94	 2BA4	 2BB4	 2BC4			
5	 2B05	 2B15	 2B25	 2B35	 2B45	 2B55	 2B65		 2B85	 2B95	 2BA5	 2BB5	 2BC5			
6	 2B06	 2B16	 2B26	 2B36	 2B46	 2B56	 2B66	 2B76	 2B86		 2BA6	 2BB6	 2BC6			
7	 2B07	 2B17	 2B27	 2B37	 2B47	 2B57	 2B67	 2B77	 2B87		 2BA7	 2BB7	 2BC7			
8	 2B08	 2B18	 2B28	 2B38	 2B48	 2B58	 2B68	 2B78	 2B88	 2B98	 2BA8	 2BB8	 2BC8			
9	 2B09	 2B19	 2B29	 2B39	 2B49	 2B59	 2B69	 2B79	 2B89	 2B99	 2BA9	 2BB9				
A	 2B0A	 2B1A	 2B2A	 2B3A	 2B4A	 2B5A	 2B6A	 2B7A	 2B8A	 2B9A	 2BA A		 2BCA			
B	 2B0B	 2B1B	 2B2B	 2B3B	 2B4B	 2B5B	 2B6B	 2B7B	 2B8B	 2B9B	 2BA B		 2BCB			
C	 2B0C	 2B1C	 2B2C	 2B3C	 2B4C	 2B5C	 2B6C	 2B7C	 2B8C	 2B9C	 2BA C		 2BCC		 2BEC	
D	 2B0D	 2B1D	 2B2D	 2B3D	 2B4D	 2B5D	 2B6D	 2B7D	 2B8D	 2B9D	 2BA D	 2BBD	 2BCD		 2BED	
E	 2B0E	 2B1E	 2B2E	 2B3E	 2B4E	 2B5E	 2B6E	 2B7E	 2B8E	 2B9E	 2BA E	 2BBE	 2BCE		 2BEE	
F	 2B0F	 2B1F	 2B2F	 2B3F	 2B4F	 2B5F	 2B6F	 2B7F	 2B8F	 2B9F	 2BA F	 2BBF	 2BCF		 2BEF	

	1D40	1D41	1D42	1D43	1D44	1D45	1D46	1D47	1D48	1D49	1D4A	1D4B	1D4C	1D4D	1D4E	1D4F
0	A 1D400	Q 1D410	<i>g</i> 1D420	w 1D430	M 1D440	<i>c</i> 1D450	<i>s</i> 1D460	I 1D470	Y 1D480	<i>o</i> 1D490		<i>U</i> 1D4B0	<i>k</i> 1D4C0	A 1D4D0	Q 1D4E0	<i>g</i> 1D4F0
1	B 1D401	R 1D411	<i>h</i> 1D421	x 1D431	N 1D441	<i>d</i> 1D451	<i>t</i> 1D461	J 1D471	Z 1D481	<i>p</i> 1D491		<i>V</i> 1D4B1	<i>l</i> 1D4C1	B 1D4D1	R 1D4E1	<i>h</i> 1D4F1
2	C 1D402	S 1D412	<i>i</i> 1D422	<i>y</i> 1D432	O 1D442	<i>e</i> 1D452	<i>u</i> 1D462	K 1D472	<i>a</i> 1D482	<i>q</i> 1D492	G 1D4A2	<i>W</i> 1D4B2	<i>m</i> 1D4C2	C 1D4D2	S 1D4E2	<i>i</i> 1D4F2
3	D 1D403	T 1D413	<i>j</i> 1D423	z 1D433	P 1D443	<i>f</i> 1D453	<i>v</i> 1D463	L 1D473	<i>b</i> 1D483	<i>r</i> 1D493		<i>X</i> 1D4B3	<i>n</i> 1D4C3	D 1D4D3	T 1D4E3	<i>j</i> 1D4F3
4	E 1D404	U 1D414	<i>k</i> 1D424	A 1D434	Q 1D444	<i>g</i> 1D454	<i>w</i> 1D464	M 1D474	<i>c</i> 1D484	<i>s</i> 1D494		<i>Y</i> 1D4B4		E 1D4D4	U 1D4E4	<i>k</i> 1D4F4
5	F 1D405	V 1D415	<i>l</i> 1D425	B 1D435	R 1D445		<i>x</i> 1D465	N 1D475	<i>d</i> 1D485	<i>t</i> 1D495	J 1D4A5	L 1D4B5	<i>p</i> 1D4C5	F 1D4D5	V 1D4E5	<i>l</i> 1D4F5
6	G 1D406	W 1D416	<i>m</i> 1D426	C 1D436	S 1D446	<i>i</i> 1D456	<i>y</i> 1D466	O 1D476	<i>e</i> 1D486	<i>u</i> 1D496	K 1D4A6	<i>a</i> 1D4B6	<i>q</i> 1D4C6	G 1D4D6	W 1D4E6	<i>m</i> 1D4F6
7	H 1D407	X 1D417	<i>n</i> 1D427	D 1D437	T 1D447	<i>j</i> 1D457	<i>z</i> 1D467	P 1D477	<i>f</i> 1D487	<i>v</i> 1D497		<i>l</i> 1D4B7	<i>r</i> 1D4C7	H 1D4D7	X 1D4E7	<i>n</i> 1D4F7
8	I 1D408	Y 1D418	<i>o</i> 1D428	E 1D438	U 1D448	<i>k</i> 1D458	A 1D468	Q 1D478	<i>g</i> 1D488	<i>w</i> 1D498		<i>c</i> 1D4B8	<i>s</i> 1D4C8	J 1D4D8	Y 1D4E8	<i>o</i> 1D4F8
9	J 1D409	Z 1D419	<i>p</i> 1D429	F 1D439	V 1D449	<i>l</i> 1D459	B 1D469	R 1D479	<i>h</i> 1D489	<i>x</i> 1D499	N 1D4A9	<i>d</i> 1D4B9	<i>t</i> 1D4C9	J 1D4D9	Z 1D4E9	<i>p</i> 1D4F9
A	K 1D40A	<i>a</i> 1D41A	<i>q</i> 1D42A	G 1D43A	W 1D44A	<i>m</i> 1D45A	C 1D46A	S 1D47A	<i>i</i> 1D48A	<i>y</i> 1D49A	O 1D4AA		<i>u</i> 1D4CA	K 1D4DA	<i>a</i> 1D4EA	<i>q</i> 1D4FA
B	L 1D40B	<i>b</i> 1D41B	<i>r</i> 1D42B	H 1D43B	X 1D44B	<i>n</i> 1D45B	D 1D46B	T 1D47B	<i>j</i> 1D48B	<i>z</i> 1D49B	P 1D4AB	<i>f</i> 1D4BB	<i>v</i> 1D4CB	L 1D4DB	<i>l</i> 1D4EB	<i>r</i> 1D4FB
C	M 1D40C	<i>c</i> 1D41C	<i>s</i> 1D42C	I 1D43C	Y 1D44C	<i>o</i> 1D45C	E 1D46C	U 1D47C	<i>k</i> 1D48C	A 1D49C	Q 1D4AC		<i>w</i> 1D4CC	M 1D4DC	<i>c</i> 1D4EC	<i>s</i> 1D4FC
D	N 1D40D	<i>d</i> 1D41D	<i>t</i> 1D42D	J 1D43D	Z 1D44D	<i>p</i> 1D45D	F 1D46D	V 1D47D	<i>l</i> 1D48D			<i>h</i> 1D4BD	<i>x</i> 1D4CD	N 1D4DD	<i>d</i> 1D4ED	<i>t</i> 1D4FD
E	O 1D40E	<i>e</i> 1D41E	<i>u</i> 1D42E	K 1D43E	<i>a</i> 1D44E	<i>q</i> 1D45E	G 1D46E	W 1D47E	<i>m</i> 1D48E	C 1D49E	S 1D4AE	<i>i</i> 1D4BE	<i>y</i> 1D4CE	O 1D4DE	<i>e</i> 1D4EE	<i>u</i> 1D4FE
F	P 1D40F	<i>f</i> 1D41F	<i>v</i> 1D42F	L 1D43F	<i>b</i> 1D44F	<i>r</i> 1D45F	H 1D46F	X 1D47F	<i>n</i> 1D48F	D 1D49F	T 1D4AF	<i>j</i> 1D4BF	<i>z</i> 1D4CF	P 1D4DF	<i>f</i> 1D4EF	<i>v</i> 1D4FF

1D50 1D51 1D52 1D53 1D54 1D55 1D56 1D57 1D58 1D59 1D5A 1D5B 1D5C 1D5D 1D5E 1D5F

0	<i>w</i> 1D500	<i>M</i> 1D510	<i>c</i> 1D520	<i>s</i> 1D530	<i>l</i> 1D540	<i>Y</i> 1D550	<i>o</i> 1D560	<i>Œ</i> 1D570	<i>U</i> 1D580	<i>f</i> 1D590	<i>A</i> 1D5A0	<i>Q</i> 1D5B0	<i>g</i> 1D5C0	<i>w</i> 1D5D0	<i>M</i> 1D5E0	<i>c</i> 1D5F0
1	<i>x</i> 1D501	<i>N</i> 1D511	<i>d</i> 1D521	<i>t</i> 1D531	<i>J</i> 1D541		<i>p</i> 1D561	<i>Ɔ</i> 1D571	<i>B</i> 1D581	<i>l</i> 1D591	<i>B</i> 1D5A1	<i>R</i> 1D5B1	<i>h</i> 1D5C1	<i>x</i> 1D5D1	<i>N</i> 1D5E1	<i>d</i> 1D5F1
2	<i>y</i> 1D502	<i>D</i> 1D512	<i>e</i> 1D522	<i>u</i> 1D532	<i>K</i> 1D542	<i>a</i> 1D552	<i>q</i> 1D562	<i>Œ</i> 1D572	<i>W</i> 1D582	<i>m</i> 1D592	<i>C</i> 1D5A2	<i>S</i> 1D5B2	<i>i</i> 1D5C2	<i>y</i> 1D5D2	<i>O</i> 1D5E2	<i>e</i> 1D5F2
3	<i>z</i> 1D503	<i>P</i> 1D513	<i>f</i> 1D523	<i>v</i> 1D533	<i>L</i> 1D543	<i>b</i> 1D553	<i>r</i> 1D563	<i>Ɔ</i> 1D573	<i>X</i> 1D583	<i>n</i> 1D593	<i>D</i> 1D5A3	<i>T</i> 1D5B3	<i>j</i> 1D5C3	<i>z</i> 1D5D3	<i>P</i> 1D5E3	<i>f</i> 1D5F3
4	<i>U</i> 1D504	<i>Q</i> 1D514	<i>g</i> 1D524	<i>w</i> 1D534	<i>M</i> 1D544	<i>c</i> 1D554	<i>s</i> 1D564	<i>Ɔ</i> 1D574	<i>Y</i> 1D584	<i>o</i> 1D594	<i>E</i> 1D5A4	<i>U</i> 1D5B4	<i>k</i> 1D5C4	<i>A</i> 1D5D4	<i>Q</i> 1D5E4	<i>g</i> 1D5F4
5	<i>B</i> 1D505		<i>h</i> 1D525	<i>x</i> 1D535		<i>d</i> 1D555	<i>t</i> 1D565	<i>Ɔ</i> 1D575	<i>3</i> 1D585	<i>p</i> 1D595	<i>F</i> 1D5A5	<i>V</i> 1D5B5	<i>l</i> 1D5C5	<i>B</i> 1D5D5	<i>R</i> 1D5E5	<i>h</i> 1D5F5
6		<i>Œ</i> 1D516	<i>i</i> 1D526	<i>η</i> 1D536	<i>⊙</i> 1D546	<i>e</i> 1D556	<i>w</i> 1D566	<i>Ɔ</i> 1D576	<i>a</i> 1D586	<i>q</i> 1D596	<i>G</i> 1D5A6	<i>W</i> 1D5B6	<i>m</i> 1D5C6	<i>C</i> 1D5D6	<i>S</i> 1D5E6	<i>i</i> 1D5F6
7	<i>D</i> 1D507	<i>Z</i> 1D517	<i>j</i> 1D527	<i>z</i> 1D537		<i>f</i> 1D557	<i>v</i> 1D567	<i>Ɔ</i> 1D577	<i>b</i> 1D587	<i>r</i> 1D597	<i>H</i> 1D5A7	<i>X</i> 1D5B7	<i>n</i> 1D5C7	<i>D</i> 1D5D7	<i>T</i> 1D5E7	<i>j</i> 1D5F7
8	<i>Œ</i> 1D508	<i>U</i> 1D518	<i>f</i> 1D528	<i>A</i> 1D538		<i>g</i> 1D558	<i>w</i> 1D568	<i>M</i> 1D578	<i>c</i> 1D588	<i>s</i> 1D598	<i>I</i> 1D5A8	<i>Y</i> 1D5B8	<i>o</i> 1D5C8	<i>E</i> 1D5D8	<i>U</i> 1D5E8	<i>k</i> 1D5F8
9	<i>Ɔ</i> 1D509	<i>B</i> 1D519	<i>l</i> 1D529	<i>B</i> 1D539		<i>h</i> 1D559	<i>x</i> 1D569	<i>N</i> 1D579	<i>d</i> 1D589	<i>t</i> 1D599	<i>J</i> 1D5A9	<i>Z</i> 1D5B9	<i>p</i> 1D5C9	<i>F</i> 1D5D9	<i>V</i> 1D5E9	<i>l</i> 1D5F9
A	<i>Œ</i> 1D50A	<i>W</i> 1D51A	<i>m</i> 1D52A		<i>S</i> 1D54A	<i>i</i> 1D55A	<i>y</i> 1D56A	<i>D</i> 1D57A	<i>e</i> 1D58A	<i>u</i> 1D59A	<i>K</i> 1D5AA	<i>a</i> 1D5BA	<i>q</i> 1D5CA	<i>G</i> 1D5DA	<i>W</i> 1D5EA	<i>m</i> 1D5FA
B		<i>X</i> 1D51B	<i>n</i> 1D52B	<i>D</i> 1D53B	<i>T</i> 1D54B	<i>j</i> 1D55B	<i>z</i> 1D56B	<i>P</i> 1D57B	<i>f</i> 1D58B	<i>v</i> 1D59B	<i>L</i> 1D5AB	<i>b</i> 1D5BB	<i>r</i> 1D5CB	<i>H</i> 1D5DB	<i>X</i> 1D5EB	<i>n</i> 1D5FB
C		<i>Y</i> 1D51C	<i>o</i> 1D52C	<i>E</i> 1D53C	<i>U</i> 1D54C	<i>k</i> 1D55C	<i>U</i> 1D56C	<i>Q</i> 1D57C	<i>g</i> 1D58C	<i>w</i> 1D59C	<i>M</i> 1D5AC	<i>c</i> 1D5BC	<i>s</i> 1D5CC	<i>I</i> 1D5DC	<i>Y</i> 1D5EC	<i>o</i> 1D5FC
D	<i>Ɔ</i> 1D50D		<i>p</i> 1D52D	<i>F</i> 1D53D	<i>V</i> 1D54D	<i>l</i> 1D55D	<i>B</i> 1D56D	<i>R</i> 1D57D	<i>h</i> 1D58D	<i>x</i> 1D59D	<i>N</i> 1D5AD	<i>d</i> 1D5BD	<i>t</i> 1D5CD	<i>J</i> 1D5DD	<i>Z</i> 1D5ED	<i>p</i> 1D5FD
E	<i>Ɔ</i> 1D50E	<i>a</i> 1D51E	<i>q</i> 1D52E	<i>G</i> 1D53E	<i>W</i> 1D54E	<i>m</i> 1D55E	<i>Œ</i> 1D56E	<i>Œ</i> 1D57E	<i>i</i> 1D58E	<i>η</i> 1D59E	<i>O</i> 1D5AE	<i>e</i> 1D5BE	<i>u</i> 1D5CE	<i>K</i> 1D5DE	<i>a</i> 1D5EE	<i>q</i> 1D5FE
F	<i>Ɔ</i> 1D50F	<i>b</i> 1D51F	<i>r</i> 1D52F		<i>X</i> 1D54F	<i>n</i> 1D55F	<i>D</i> 1D56F	<i>Z</i> 1D57F	<i>j</i> 1D58F	<i>z</i> 1D59F	<i>P</i> 1D5AF	<i>f</i> 1D5BF	<i>v</i> 1D5CF	<i>L</i> 1D5DF	<i>b</i> 1D5EF	<i>r</i> 1D5FF

1D60 1D61 1D62 1D63 1D64 1D65 1D66 1D67 1D68 1D69 1D6A 1D6B 1D6C 1D6D 1D6E 1D6F

0	s 1D600	I 1D610	Y 1D620	o 1D630	E 1D640	U 1D650	k 1D660	A 1D670	Q 1D680	g 1D690	w 1D6A0	I 1D6B0	Ω 1D6C0	o 1D6D0	q 1D6E0	O 1D6F0
1	t 1D601	J 1D611	Z 1D621	p 1D631	F 1D641	V 1D651	I 1D661	B 1D671	R 1D681	h 1D691	x 1D6A1	K 1D6B1	∇ 1D6C1	π 1D6D1	ω 1D6E1	Π 1D6F1
2	u 1D602	K 1D612	a 1D622	q 1D632	G 1D642	W 1D652	m 1D662	C 1D672	S 1D682	i 1D692	y 1D6A2	Λ 1D6B2	α 1D6C2	ρ 1D6D2	A 1D6E2	P 1D6F2
3	v 1D603	L 1D613	b 1D623	r 1D633	H 1D643	X 1D653	n 1D663	D 1D673	T 1D683	j 1D693	z 1D6A3	M 1D6B3	β 1D6C3	ς 1D6D3	B 1D6E3	Θ 1D6F3
4	w 1D604	M 1D614	c 1D624	s 1D634	I 1D644	Y 1D654	o 1D664	E 1D674	U 1D684	k 1D694	l 1D6A4	N 1D6B4	γ 1D6C4	σ 1D6D4	Γ 1D6E4	Σ 1D6F4
5	x 1D605	N 1D615	d 1D625	t 1D635	J 1D645	Z 1D655	p 1D665	F 1D675	V 1D685	l 1D695	J 1D6A5	Ξ 1D6B5	δ 1D6C5	τ 1D6D5	Δ 1D6E5	T 1D6F5
6	y 1D606	O 1D616	e 1D626	u 1D636	K 1D646	a 1D656	q 1D666	G 1D676	W 1D686	m 1D696		O 1D6B6	ε 1D6C6	υ 1D6D6	E 1D6E6	Y 1D6F6
7	z 1D607	P 1D617	f 1D627	v 1D637	L 1D647	b 1D657	r 1D667	H 1D677	X 1D687	n 1D697		Π 1D6B7	ζ 1D6C7	φ 1D6D7	Z 1D6E7	Φ 1D6F7
8	A 1D608	Q 1D618	g 1D628	w 1D638	M 1D648	c 1D658	s 1D668	I 1D678	Y 1D688	o 1D698	A 1D6A8	P 1D6B8	η 1D6C8	χ 1D6D8	H 1D6E8	X 1D6F8
9	B 1D609	R 1D619	h 1D629	x 1D639	N 1D649	d 1D659	t 1D669	J 1D679	Z 1D689	p 1D699	B 1D6A9	Θ 1D6B9	θ 1D6C9	ψ 1D6D9	Θ 1D6E9	Ψ 1D6F9
A	C 1D60A	S 1D61A	i 1D62A	y 1D63A	O 1D64A	e 1D65A	u 1D66A	K 1D67A	a 1D68A	q 1D69A	Γ 1D6AA	Σ 1D6BA	ι 1D6CA	ω 1D6DA	I 1D6EA	Ω 1D6FA
B	D 1D60B	T 1D61B	j 1D62B	z 1D63B	P 1D64B	f 1D65B	v 1D66B	L 1D67B	b 1D68B	r 1D69B	Δ 1D6AB	T 1D6BB	κ 1D6CB	δ 1D6DB	K 1D6EB	∇ 1D6FB
C	E 1D60C	U 1D61C	k 1D62C	A 1D63C	Q 1D64C	g 1D65C	w 1D66C	M 1D67C	c 1D68C	s 1D69C	E 1D6AC	Υ 1D6BC	λ 1D6CC	ε 1D6DC	Λ 1D6EC	α 1D6FC
D	F 1D60D	V 1D61D	I 1D62D	B 1D63D	R 1D64D	h 1D65D	x 1D66D	N 1D67D	d 1D68D	t 1D69D	Z 1D6AD	Φ 1D6BD	μ 1D6CD	ϑ 1D6DD	M 1D6ED	β 1D6FD
E	G 1D60E	W 1D61E	m 1D62E	C 1D63E	S 1D64E	i 1D65E	y 1D66E	O 1D67E	e 1D68E	u 1D69E	H 1D6AE	X 1D6BE	ν 1D6CE	κ 1D6DE	N 1D6EE	γ 1D6FE
F	H 1D60F	X 1D61F	n 1D62F	D 1D63F	T 1D64F	j 1D65F	z 1D66F	P 1D67F	f 1D68F	v 1D69F	Θ 1D6AF	Ψ 1D6BF	ξ 1D6CF	φ 1D6DF	Ξ 1D6EF	δ 1D6FF

	1D70	1D71	1D72	1D73	1D74	1D75	1D76	1D77	1D78	1D79	1D7A	1D7B	1D7C	1D7D	1D7E	1D7F
0	ϵ 1D700	υ 1D710	E 1D720	Y 1D730	λ 1D740	ϵ 1D750	Λ 1D760	α 1D770	ρ 1D780	A 1D790	P 1D7A0	η 1D7B0	χ 1D7C0	2 1D7D0	8 1D7E0	4 1D7F0
1	ζ 1D701	ϕ 1D711	Z 1D721	Φ 1D731	μ 1D741	ϑ 1D751	M 1D761	β 1D771	ς 1D781	B 1D791	Θ 1D7A1	θ 1D7B1	ψ 1D7C1	3 1D7D1	9 1D7E1	5 1D7F1
2	η 1D702	χ 1D712	H 1D722	X 1D732	ν 1D742	κ 1D752	N 1D762	γ 1D772	σ 1D782	Γ 1D792	Σ 1D7A2	ι 1D7B2	ω 1D7C2	4 1D7D2	0 1D7E2	6 1D7F2
3	θ 1D703	ψ 1D713	Θ 1D723	Ψ 1D733	ξ 1D743	ϕ 1D753	Ξ 1D763	δ 1D773	τ 1D783	Δ 1D793	T 1D7A3	κ 1D7B3	ϑ 1D7C3	5 1D7D3	1 1D7E3	7 1D7F3
4	ι 1D704	ω 1D714	I 1D724	Ω 1D734	o 1D744	ρ 1D754	O 1D764	ϵ 1D774	υ 1D784	E 1D794	Y 1D7A4	λ 1D7B4	ϵ 1D7C4	6 1D7D4	2 1D7E4	8 1D7F4
5	κ 1D705	ϑ 1D715	K 1D725	∇ 1D735	π 1D745	ϖ 1D755	Π 1D765	ζ 1D775	ϕ 1D785	Z 1D795	Φ 1D7A5	μ 1D7B5	ϑ 1D7C5	7 1D7D5	3 1D7E5	9 1D7F5
6	λ 1D706	ϵ 1D716	Λ 1D726	α 1D736	ρ 1D746	A 1D756	P 1D766	η 1D776	χ 1D786	H 1D796	X 1D7A6	ν 1D7B6	κ 1D7C6	8 1D7D6	4 1D7E6	0 1D7F6
7	μ 1D707	ϑ 1D717	M 1D727	β 1D737	ς 1D747	B 1D757	Θ 1D767	θ 1D777	ψ 1D787	Θ 1D797	Ψ 1D7A7	ξ 1D7B7	ϕ 1D7C7	9 1D7D7	5 1D7E7	1 1D7F7
8	ν 1D708	κ 1D718	N 1D728	γ 1D738	σ 1D748	Γ 1D758	Σ 1D768	ι 1D778	ω 1D788	I 1D798	Ω 1D7A8	o 1D7B8	ρ 1D7C8	0 1D7D8	6 1D7E8	2 1D7F8
9	ξ 1D709	ϕ 1D719	Ξ 1D729	δ 1D739	τ 1D749	Δ 1D759	T 1D769	κ 1D779	ϑ 1D789	K 1D799	∇ 1D7A9	π 1D7B9	ϖ 1D7C9	1 1D7D9	7 1D7E9	3 1D7F9
A	o 1D70A	ρ 1D71A	O 1D72A	ϵ 1D73A	υ 1D74A	E 1D75A	Y 1D76A	λ 1D77A	ϵ 1D78A	Λ 1D79A	α 1D7AA	ρ 1D7BA	F 1D7CA	2 1D7DA	8 1D7EA	4 1D7FA
B	π 1D70B	ϖ 1D71B	Π 1D72B	ζ 1D73B	ϕ 1D74B	Z 1D75B	Φ 1D76B	μ 1D77B	ϑ 1D78B	M 1D79B	β 1D7AB	ς 1D7BB	F 1D7CB	3 1D7DB	9 1D7EB	5 1D7FB
C	ρ 1D70C	A 1D71C	P 1D72C	η 1D73C	χ 1D74C	H 1D75C	X 1D76C	ν 1D77C	κ 1D78C	N 1D79C	γ 1D7AC	σ 1D7BC		4 1D7DC	0 1D7EC	6 1D7FC
D	ς 1D70D	B 1D71D	Θ 1D72D	θ 1D73D	ψ 1D74D	Θ 1D75D	Ψ 1D76D	ξ 1D77D	ϕ 1D78D	Ξ 1D79D	δ 1D7AD	τ 1D7BD		5 1D7DD	1 1D7ED	7 1D7FD
E	σ 1D70E	Γ 1D71E	Σ 1D72E	ι 1D73E	ω 1D74E	I 1D75E	Ω 1D76E	o 1D77E	ρ 1D78E	O 1D79E	ϵ 1D7AE	υ 1D7BE	0 1D7CE	6 1D7DE	2 1D7EE	8 1D7FE
F	τ 1D70F	Δ 1D71F	T 1D72F	κ 1D73F	ϑ 1D74F	K 1D75F	∇ 1D76F	π 1D77F	ϖ 1D78F	Π 1D79F	ζ 1D7AF	ϕ 1D7BF	1 1D7CF	7 1D7DF	3 1D7EF	9 1D7FF