Mathematical Operators

Range: 2200–22FF

This file contains an excerpt from the character code tables and list of character names for
The Unicode Standard, Version 18.0 ALPHA REVIEW DRAFT

Characters in this chart that are new for The Unicode Standard, Version 18.0 are shown in conjunction with any existing characters. For ease of reference, the new characters have been highlighted in the chart grid and in the names list. This file will not be updated with errata, or when additional characters are assigned to the Unicode Standard.

See https://www.unicode.org/errata/ for an up-to-date list of errata.

See https://www.unicode.org/charts/ for access to a complete list of the latest character code charts. See https://www.unicode.org/charts/PDF/Unicode-18.0/ for charts showing only the characters added in Unicode 18.0. See https://www.unicode.org/Public/18.0.0/charts/ for a complete archived file of character code charts for Unicode 18.0. See https://www.unicode.org/charts/About.html#Conventions for conventions used in these code charts, and other general information.

Disclaimer

These charts are provided as the online reference to the character contents of the Unicode Standard, Version 18.0 but do not provide all the information needed to fully support individual scripts using the Unicode Standard. For a complete understanding of the use of the characters contained in this file, please consult the appropriate sections of The Unicode Standard, Version 18.0, online at https://www.unicode.org/versions/Unicode18.0.0/, as well as the Unicode Standard Annexes, the other Unicode Technical Reports and Standards, and the Unicode Character Database, which are available online.

See https://www.unicode.org/ucd/ and https://www.unicode.org/reports/

A thorough understanding of the information contained in these additional sources is required for a successful implementation.

Fonts

The shapes of the reference glyphs used in these code charts are not prescriptive. Considerable variation is to be expected in actual fonts.

See https://www.unicode.org/charts/fonts.html for a list.

Terms of Use

	220	221	222	223	224	225	226	227	228	229	22A	22B	22C	22D	22E	22F
0	∀ 2200	∐ 2210	∠ 2220	∰ 2230	∿ 2240	≐ 2250	≠ 2260	≰ 2270	⊀ 2280	⊐ 2290	⊠ 22A0	⊰ 22B0	⋀ 22C0	⋐ 22D0	⋠ 22E0	⋰ 22F0
1	∁ 2201	∑ 2211	∡ 2221	∱ 2231	≁ 2241	≑ 2251	≡ 2261	≱ 2271	⊁ 2281	⊑ 2291	⊡ 22A1	⊱ 22B1	⋁ 22C1	⋑ 22D1	⋡ 22E1	⋱ 22F1
2	∂ 2202	− 2212	∢ 2222	∲ 2232	≂ 2242	≒ 2252	≢ 2262	≲ 2272	⊂ 2282	⊒ 2292	⊢ 22A2	⊲ 22B2	⋂ 22C2	⋒ 22D2	⋢ 22E2	∈ 22F2
3	∃ 2203	∓ 2213	∣ 2223	∳ 2233	≃ 2243	≓ 2253	≣ 2263	≳ 2273	⊃ 2283	⊓ 2293	⊣ 22A3	⊳ 22B3	⋃ 22C3	⋓ 22D3	⋣ 22E3	∈ 22F3
4	∄ 2204	∔ 2214	∤ 2224	∴ 2234	≄ 2244	≔ 2254	≤ 2264	≴ 2274	⊄ 2284	⊔ 2294	⊤ 22A4	⊴ 22B4	⋄ 22C4	⋔ 22D4	⋤ 22E4	∈ 22F4
5	∅ 2205	∕ 2215	∥ 2225	∵ 2235	≅ 2245	=: 2255	≥ 2265	≵ 2275	⊅ 2285	⊕ 2295	⊥ 22A5	⊵ 22B5	⋅ 22C5	⋕ 22D5	⋥ 22E5	∈ 22F5
6	∆ 2206	∖ 2216	∦ 2226	∶ 2236	≆ 2246	∎ 2256	≦ 2266	≶ 2276	⊆ 2286	⊖ 2296	⊦ 22A6	⊶ 22B6	⋆ 22C6	⋖ 22D6	⋦ 22E6	∈ 22F6
7	∇ 2207	∗ 2217	∧ 2227	∷ 2237	≇ 2247	≗ 2257	≧ 2267	≷ 2277	⊇ 2287	⊗ 2297	⊧ 22A7	⊷ 22B7	⋇ 22C7	⋗ 22D7	⋧ 22E7	∈ 22F7
8	∈ 2208	∘ 2218	∨ 2228	∸ 2238	≈ 2248	≘ 2258	≨ 2268	≸ 2278	⊈ 2288	⊘ 2298	⊨ 22A8	⊸ 22B8	⋈ 22C8	⋘ 22D8	⋨ 22E8	⋸ 22F8
9	∉ 2209	∙ 2219	∩ 2229	∹ 2239	≉ 2249	≙ 2259	≩ 2269	≹ 2279	⊉ 2289	⊙ 2299	⊩ 22A9	⊹ 22B9	⋉ 22C9	⋙ 22D9	⋩ 22E9	⋹ 22F9
A	∊ 220A	√ 221A	∪ 222A	∺ 223A	≊ 224A	≚ 225A	≪ 226A	≺ 227A	⊊ 228A	⊚ 229A	⊪ 22AA	⊺ 22BA	⋊ 22CA	⋚ 22DA	⋪ 22EA	⋺ 22FA
B	∋ 220B	∛ 221B	∫ 222B	∻ 223B	≋ 224B	≛ 225B	≫ 226B	≻ 227B	⊋ 228B	⊛ 229B	⊫ 22AB	⊻ 22BB	⋋ 22CB	⋛ 22DB	⋫ 22EB	⋻ 22FB
C	∌ 220C	∜ 221C	∬ 222C	∼ 223C	≌ 224C	≜ 225C	⟗ 226C	≼ 227C	⊌ 228C	⊜ 229C	⊬ 22AC	⊼ 22BC	⋌ 22CC	⋜ 22DC	⋬ 22EC	⋼ 22FC
D	∍ 220D	∝ 221D	∭ 222D	∽ 223D	≍ 224D	≝ 225D	≭ 226D	≽ 227D	⊍ 228D	⊝ 229D	⊭ 22AD	⊽ 22BD	⋍ 22CD	⋝ 22DD	⋭ 22ED	⋽ 22FD
E	∎ 220E	∞ 221E	∮ 222E	∾ 223E	≎ 224E	≞ 225E	≮ 226E	≾ 227E	⊎ 228E	⊞ 229E	⊮ 22AE	⊾ 22BE	⋎ 22CE	⋞ 22DE	⋮ 22EE	⋾ 22FE
F	∏ 220F	∟ 221F	∯ 222F	∿ 223F	≏ 224F	≟ 225F	≯ 226F	≿ 227F	⊏ 228F	⊟ 229F	⊯ 22AF	⊿ 22BF	⋏ 22CF	⋟ 22DF	⋯ 22EF	⊏ 22FF

Miscellaneous mathematical symbols

2200 ∀ FOR ALL
= universal quantifier
2201 ∁ COMPLEMENT
→ 0297 ƈ latin letter stretched c
2202 ∂ PARTIAL DIFFERENTIAL
2203 ∃ THERE EXISTS
= existential quantifier
2204 ∄ THERE DOES NOT EXIST
≡ 2203 ∃ 0338 ̸
2205 ∅ EMPTY SET
= null set
• used in linguistics to indicate a null morpheme
or phonological "zero"
→ 00D8 Ø latin capital letter o with stroke
→ 2300 ⌀ diameter sign
~ 2205 FE00 ∅ zero with long diagonal stroke
overlay form
2206 ∆ 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 △ 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 ∈ ELEMENT OF
2209 ∉ NOT AN ELEMENT OF
≡ 2208 ∈ 0338 ̸
220A ∊ SMALL ELEMENT OF
• originates in math pi fonts; not the straight
epsilon
→ 03F5 ϵ greek lunate epsilon symbol
220B ∋ CONTAINS AS MEMBER
= such that
220C ∌ DOES NOT CONTAIN AS MEMBER
≡ 220B ∋ 0338 ̸
220D ∍ SMALL CONTAINS AS MEMBER
→ 03F6 ϶ greek reversed lunate epsilon symbol

Miscellaneous mathematical symbol

220E ∎ END OF PROOF
= q.e.d.
→ 2023 ‣ triangular bullet
→ 25AE ▮ black vertical rectangle

N-ary operators

220F ∏ N-ARY PRODUCT
= product sign
→ 03A0 Π greek capital letter pi
2210 ∐ N-ARY COPRODUCT
= coproduct sign
2211 ∑ N-ARY SUMMATION
= summation sign
→ 03A3 Σ greek capital letter sigma
→ 2140 ⅀ double-struck n-ary summation

Operators

2212 − MINUS SIGN
→ 002D - hyphen-minus
→ 2796 ➖ heavy minus sign
2213 ∓ MINUS-OR-PLUS SIGN
→ 00B1 ± plus-minus sign
2214 ∔ DOT PLUS
2215 ∕ DIVISION SLASH
• generic division operator
→ 002F / solidus
→ 2044 ⁄ fraction slash
→ 27CB ╱ mathematical rising diagonal
2216 ∖ SET MINUS
→ 005C \ reverse solidus
→ 27CD ╲ mathematical falling diagonal
→ 29F5 ⧵ reverse solidus operator
2217 ∗ ASTERISK OPERATOR
• may be used to represent the telephony
asterisk seen on keypads
→ 002A * asterisk
2218 ∘ RING OPERATOR
= composite function
= APL jot
→ 00B0 ° degree sign
→ 0970 ॰ devanagari abbreviation sign
→ 25E6 ◦ white bullet
→ 10B39 ∘ avestan abbreviation mark
2219 ∙ BULLET OPERATOR
→ 00B7 · middle dot
→ 2022 • bullet
→ 2024 ․ one dot leader
221A √ SQUARE ROOT
= radical sign
→ 2713 ✓ check mark
221B ∛ CUBE ROOT
→ 0606 ؆ arabic-indic cube root
221C ∜ FOURTH ROOT
→ 0607 ؇ arabic-indic fourth root
221D ∝ PROPORTIONAL TO
→ 03B1 α greek small letter alpha

Miscellaneous mathematical symbol

221E ∞ INFINITY

Angles

Other angle symbols are found at 299B-29AF.

221F ∟ RIGHT ANGLE
= with (in chess notation)
→ 2BFE ⦤ reversed right angle
2220 ∠ ANGLE
• used in astrological contexts for aspect
semisquare
→ 299F ∟ acute angle
2221 ∡ MEASURED ANGLE
→ 1CEF9 ⦙ measured angle with double arc
2222 ∢ SPHERICAL ANGLE
= angle arc

Relations

2223 | DIVIDES
= such that
= APL stile
→ 007C | vertical line
→ 01C0 ǀ latin letter dental click

2224	∤	DOES NOT DIVIDE
		≡ 2223 | 0338 ◌̸
2225	∥	PARALLEL TO
		→ 01C1 ǁ latin letter lateral click
		→ 2016 ‖ double vertical line
2226	∦	NOT PARALLEL TO
		≡ 2225 ∥ 0338 ◌̸

Logical and set operators

2227	∧	LOGICAL AND
		= wedge, conjunction
		→ 22C0 ⋀ n-ary logical and
		→ 2303 ⌃ up arrowhead
		→ 27D1 ⟑ and with dot
2228	∨	LOGICAL OR
		= vee, disjunction
		→ 22C1 ⋁ n-ary logical or
		→ 2304 ⌄ down arrowhead
		→ 27C7 ⟇ or with dot inside
2229	∩	INTERSECTION
		= cap, hat
		→ 22C2 ⋂ n-ary intersection
		~ 2229 FE00 ∩ with serifs
222A	∪	UNION
		= cup
		→ 22C3 ⋃ n-ary union
		~ 222A FE00 ∪ with serifs

Integrals

222B	∫	INTEGRAL
		→ 0283 ʃ latin small letter esh
222C	∬	DOUBLE INTEGRAL
		≈ 222B ∫ 222B ∫
222D	∭	TRIPLE INTEGRAL
		→ 2A0C ⨌ quadruple integral operator
		≈ 222B ∫ 222B ∫ 222B ∫
222E	∮	CONTOUR INTEGRAL
		→ 2A15 ⨕ integral around a point operator
222F	∯	SURFACE INTEGRAL
		≈ 222E ∮ 222E ∮
2230	∰	VOLUME INTEGRAL
		≈ 222E ∮ 222E ∮ 222E ∮
2231	∱	CLOCKWISE INTEGRAL
2232	∲	CLOCKWISE CONTOUR INTEGRAL
2233	∳	ANTICLOCKWISE CONTOUR INTEGRAL
		• clockwise or anticlockwise arrows do not reverse during layout mirroring

Miscellaneous mathematical symbols

2234	∴	THEREFORE
		→ 26EC ⛬ historic site
2235	∵	BECAUSE

Relations

2236	∶	RATIO
		• preferred to 003A : for denotation of division or scale in mathematical use
		→ 003A : colon
2237	∷	PROPORTION

Operator

2238	∸	DOT MINUS
		= saturating subtraction
		• sometimes claimed as notation for symmetric set difference, but 2206 ∆ is preferred

Relation

2239	∹	EXCESS

Operator

223A	∺	GEOMETRIC PROPORTION

Relations

223B	∻	HOMOTHETIC
		→ 2A6B ⩫ tilde operator with rising dots
223C	∼	TILDE OPERATOR
		= varies with (proportional to)
		= difference between
		= similar to
		= not
		= cycle
		= APL tilde
		→ 007E ~ tilde
		→ 00AC ¬ not sign
		→ 02DC ˜ small tilde
223D	∽	REVERSED TILDE
		= lazy S
		• reversed tilde and lazy S are glyph variants
		~ 223D FE00 ∽ using lazy S
223E	∾	INVERTED LAZY S
		= most positive

Miscellaneous mathematical symbol

223F	∿	SINE WAVE
		= alternating current

Operator

2240	≀	WREATH PRODUCT

Relations

2241	≁	NOT TILDE
		≡ 223C ∼ 0338 ◌̸
2242	≂	MINUS TILDE
		~ 2242 FE00 ≂ using lazy S
2243	≃	ASYMPTOTICALLY EQUAL TO
		~ 2243 FE00 ≃ using lazy S
2244	≄	NOT ASYMPTOTICALLY EQUAL TO
		≡ 2243 ≃ 0338 ◌̸
2245	≅	APPROXIMATELY EQUAL TO
		→ 2A70 ≊ approximately equal or equal to
2246	≆	APPROXIMATELY BUT NOT ACTUALLY EQUAL TO
2247	≇	NEITHER APPROXIMATELY NOR ACTUALLY EQUAL TO
		≡ 2245 ≅ 0338 ◌̸
2248	≈	ALMOST EQUAL TO
		= asymptotic to
		~ 2248 FE00 ≈ using lazy S
2249	≉	NOT ALMOST EQUAL TO
		≡ 2248 ≈ 0338 ◌̸
224A	≊	ALMOST EQUAL OR EQUAL TO
224B	≋	TRIPLE TILDE
224C	≌	ALL EQUAL TO
		• reversed tilde and lazy S are glyph variants
224D	≍	EQUIVALENT TO
224E	≎	GEOMETRICALLY EQUIVALENT TO
224F	≏	DIFFERENCE BETWEEN
2250	≐	APPROACHES THE LIMIT
2251	≑	GEOMETRICALLY EQUAL TO
2252	≒	APPROXIMATELY EQUAL TO OR THE IMAGE OF
		= nearly equals
2253	≓	IMAGE OF OR APPROXIMATELY EQUAL TO

2254	≔	COLON EQUALS
2255	≕	EQUALS COLON
2256	≖	RING IN EQUAL TO
2257	≗	RING EQUAL TO
		= approximately equal to
2258	≘	CORRESPONDS TO
2259	≙	ESTIMATES
		= corresponds to
225A	≚	EQUIANGULAR TO
225B	≛	STAR EQUALS
225C	≜	DELTA EQUAL TO
		= equiangular
		= equal to by definition
225D	≝	EQUAL TO BY DEFINITION
225E	≞	MEASURED BY
225F	≟	QUESTIONED EQUAL TO
2260	≠	NOT EQUAL TO
		→ 003D = equals sign
		→ 01C2 ǂ latin letter alveolar click
		≡ 003D = 0338 ◌̸
2261	≡	IDENTICAL TO
2262	≢	NOT IDENTICAL TO
		≡ 2261 ≡ 0338 ◌̸
2263	≣	STRICTLY EQUIVALENT TO
2264	≤	LESS-THAN OR EQUAL TO
		→ 003C < less-than sign
2265	≥	GREATER-THAN OR EQUAL TO
		→ 003E > greater-than sign
2266	≦	LESS-THAN OVER EQUAL TO
2267	≧	GREATER-THAN OVER EQUAL TO
2268	≨	LESS-THAN BUT NOT EQUAL TO
		→ 2A87 ⪇ less-than and single-line not equal to
		~ 2268 FE00 ≨ with vertical stroke
2269	≩	GREATER-THAN BUT NOT EQUAL TO
		→ 2A88 ⪈ greater-than and single-line not equal to
		~ 2269 FE00 ≩ with vertical stroke
226A	≪	MUCH LESS-THAN
		→ 00AB « left-pointing double angle quotation mark
226B	≫	MUCH GREATER-THAN
		→ 00BB » right-pointing double angle quotation mark
226C	≬	BETWEEN
		= plaintiff, quantic
226D	≭	NOT EQUIVALENT TO
		≡ 224D ≍ 0338 ◌̸
226E	≮	NOT LESS-THAN
		≡ 003C < 0338 ◌̸
226F	≯	NOT GREATER-THAN
		≡ 003E > 0338 ◌̸
2270	≰	NEITHER LESS-THAN NOR EQUAL TO
		≡ 2264 ≤ 0338 ◌̸
2271	≱	NEITHER GREATER-THAN NOR EQUAL TO
		≡ 2265 ≥ 0338 ◌̸
2272	≲	LESS-THAN OR EQUIVALENT TO
		~ 2272 FE00 ≲ following the slant of the lower leg
2273	≳	GREATER-THAN OR EQUIVALENT TO
		~ 2273 FE00 ≳ following the slant of the lower leg
2274	≴	NEITHER LESS-THAN NOR EQUIVALENT TO
		≡ 2272 ≲ 0338 ◌̸
2275	≵	NEITHER GREATER-THAN NOR EQUIVALENT TO
		≡ 2273 ≳ 0338 ◌̸
2276	≶	LESS-THAN OR GREATER-THAN
2277	≷	GREATER-THAN OR LESS-THAN
2278	≸	NEITHER LESS-THAN NOR GREATER-THAN
		≡ 2276 ≶ 0338 ◌̸
2279	≹	NEITHER GREATER-THAN NOR LESS-THAN
		≡ 2277 ≷ 0338 ◌̸
227A	≺	PRECEDES
		= lower rank than
		→ 22B0 ⊰ precedes under relation
227B	≻	SUCCEEDS
		= higher rank than
		→ 22B1 ⊱ succeeds under relation
227C	≼	PRECEDES OR EQUAL TO
227D	≽	SUCCEEDS OR EQUAL TO
227E	≾	PRECEDES OR EQUIVALENT TO
227F	≿	SUCCEEDS OR EQUIVALENT TO
2280	⊀	DOES NOT PRECEDE
		≡ 227A ≺ 0338 ◌̸
2281	⊁	DOES NOT SUCCEED
		≡ 227B ≻ 0338 ◌̸
2282	⊂	SUBSET OF
		= included in set
		→ 2E26 ⊂ left sideways u bracket
2283	⊃	SUPERSET OF
		= includes in set
		→ 2E27 ⊃ right sideways u bracket
2284	⊄	NOT A SUBSET OF
		≡ 2282 ⊂ 0338 ◌̸
2285	⊅	NOT A SUPERSET OF
		≡ 2283 ⊃ 0338 ◌̸
2286	⊆	SUBSET OF OR EQUAL TO
2287	⊇	SUPERSET OF OR EQUAL TO
2288	⊈	NEITHER A SUBSET OF NOR EQUAL TO
		≡ 2286 ⊆ 0338 ◌̸
2289	⊉	NEITHER A SUPERSET OF NOR EQUAL TO
		≡ 2287 ⊇ 0338 ◌̸
228A	⊊	SUBSET OF WITH NOT EQUAL TO
		~ 228A FE00 ⊊ with stroke through bottom members
228B	⊋	SUPERSET OF WITH NOT EQUAL TO
		~ 228B FE00 ⊋ with stroke through bottom members

Operators

228C	⊌	MULTISET
228D	⊍	MULTISET MULTIPLICATION
		→ 2A03 ⨃ n-ary union operator with dot
		→ 2A40 ⩀ intersection with dot
228E	⊎	MULTISET UNION
		= z notation bag addition
		→ 2A04 ⨄ n-ary union operator with plus

Relations

228F	⊏	SQUARE IMAGE OF
2290	⊐	SQUARE ORIGINAL OF
2291	⊑	SQUARE IMAGE OF OR EQUAL TO
2292	⊒	SQUARE ORIGINAL OF OR EQUAL TO

Operators

2293	⊓	SQUARE CAP
		→ 2A05 ⨅ n-ary square intersection operator
		~ 2293 FE00 ⊓ with serifs

2294 ⊔ SQUARE CUP
→ 2A06 ⨆ n-ary square union operator
~ 2294 FE00 ⊔ with serifs

2295 ⊕ CIRCLED PLUS
= direct sum
= vector pointing into page
→ 2A01 ⨁ n-ary circled plus operator
→ 1F728 ⊕ alchemical symbol for verdigris
~ 2295 FE00 ⊕ with white rim

2296 ⊖ CIRCLED MINUS
= symmetric difference
→ 29B5 ⊖ circle with horizontal bar
→ 1F714 ⊖ alchemical symbol for salt

2297 ⊗ CIRCLED TIMES
= tensor product
= vector pointing into page
→ 26D2 ⊗ circled crossing lanes
→ 2A02 ⨂ n-ary circled times operator
→ 2BBE ⊗ circled x
→ 1F774 ⊗ lot of fortune
~ 2297 FE00 ⊗ with white rim

2298 ⊘ CIRCLED DIVISION SLASH

2299 ⊙ CIRCLED DOT OPERATOR
= direct product
= vector pointing out of page
→ 0298 ʘ latin letter bilabial click
→ 2609 ☉ sun
→ 2A00 ⨀ n-ary circled dot operator

229A ⊚ CIRCLED RING OPERATOR
→ 233E ⌾ apl functional symbol circle jot
→ 25CE ◎ bullseye

229B ⊛ CIRCLED ASTERISK OPERATOR
→ 235F ⍟ apl functional symbol circle star

229C ⊜ CIRCLED EQUALS
= NoDerivatives (symbol used for Creative Commons licenses)
→ 1F16D 🅭 circled cc
~ 229C FE00 ⊜ with equal sign touching the circle

229D ⊝ CIRCLED DASH

229E ⊞ SQUARED PLUS

229F ⊟ SQUARED MINUS

22A0 ⊠ SQUARED TIMES
→ 2612 ☒ ballot box with x
→ 26DD 🆇 squared saltire
→ 1F771 ⊠ alchemical symbol for month

22A1 ⊡ SQUARED DOT OPERATOR
→ 1F755 ⊡ alchemical symbol for urine
→ 1FBBC ⬛ right open squared dot

22A2 ⊢ RIGHT TACK
= turnstile
= proves, implies, yields
= reducible

22A3 ⊣ LEFT TACK
= reverse turnstile
= non-theorem, does not yield

Miscellaneous mathematical symbols

22A4 ⊤ DOWN TACK
= top
→ 2E06 ᵀ raised interpolation marker
→ 1F768 ⊤ alchemical symbol for crucible-4

22A5 ⊥ UP TACK
= base, bottom
→ 27C2 ⊥ perpendicular

Relations

22A6 ⊦ ASSERTION
= reduces to

22A7 ⊧ MODELS

22A8 ⊨ TRUE
= statement is true, valid
= is a tautology
= satisfies
= results in

22A9 ⊩ FORCES

22AA ⊪ TRIPLE VERTICAL BAR RIGHT TURNSTILE

22AB ⊫ DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE

22AC ⊬ DOES NOT PROVE
≡ 22A2 ⊢ 0338 ̸

22AD ⊭ NOT TRUE
≡ 22A8 ⊨ 0338 ̸

22AE ⊮ DOES NOT FORCE
≡ 22A9 ⊩ 0338 ̸

22AF ⊯ NEGATED DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE
≡ 22AB ⊫ 0338 ̸

22B0 ⊰ PRECEDES UNDER RELATION
→ 227A ≺ precedes

22B1 ⊱ SUCCEEDS UNDER RELATION
→ 227B ≻ succeeds

22B2 ⊲ NORMAL SUBGROUP OF
→ 25C5 ◅ white left-pointing pointer

22B3 ⊳ CONTAINS AS NORMAL SUBGROUP
→ 25BB ▻ white right-pointing pointer

22B4 ⊴ NORMAL SUBGROUP OF OR EQUAL TO

22B5 ⊵ CONTAINS AS NORMAL SUBGROUP OR EQUAL TO

22B6 ⊶ ORIGINAL OF

22B7 ⊷ IMAGE OF

22B8 ⊸ MULTIMAP

22B9 ⊹ HERMITIAN CONJUGATE MATRIX

Operators

22BA ⊺ INTERCALATE

22BB ⊻ XOR
→ 26BA ⚺ semisextile

22BC ⊼ NAND
→ 2305 ⌅ projective
→ 26BB ⚻ quincunx

22BD ⊽ NOR

Miscellaneous mathematical symbols

22BE ⊾ RIGHT ANGLE WITH ARC

22BF ⊿ RIGHT TRIANGLE

N-ary operators

22C0 ⋀ N-ARY LOGICAL AND
• also used to denote the universal quantifier
→ 2227 ∧ logical and

22C1 ⋁ N-ARY LOGICAL OR
• also used to denote the existential quantifier
→ 2228 ∨ logical or

22C2 ⋂ N-ARY INTERSECTION
= z notation generalised intersection
→ 2229 ∩ intersection

22C3 ⋃ N-ARY UNION
= z notation generalised union
→ 222A ∪ union

Operators

22C4 ◦ DIAMOND OPERATOR
→ 25C7 ◇ white diamond
→ 2B29 ◆ black small diamond

22C5 · DOT OPERATOR
• preferred to 00B7 · for denotation of multiplication
→ 00B7 · middle dot

22C6 ⋆ STAR OPERATOR
• APL
→ 066D ٭ arabic five pointed star
→ 2605 ★ black star
→ 2B50 ⭐ white medium star

22C7 ⋇ DIVISION TIMES
• ambiguous sign conflating two operators
→ 00B1 ± plus-minus sign
→ 00D7 × multiplication sign
→ 00F7 ÷ division sign
→ 2715 ✕ multiplication x

Relation

22C8 ⋈ BOWTIE
→ 2445 ⑅ ocr bow tie

Operators

22C9 ⋉ LEFT NORMAL FACTOR SEMIDIRECT PRODUCT
22CA ⋊ RIGHT NORMAL FACTOR SEMIDIRECT PRODUCT
22CB ⋋ LEFT SEMIDIRECT PRODUCT
22CC ⋌ RIGHT SEMIDIRECT PRODUCT
→ 2041 ⁁ caret insertion point

Relation

22CD ≍ REVERSED TILDE EQUALS
~ 22CD FE00 ≍ using lazy S

Logical operators

22CE ⋎ CURLY LOGICAL OR
22CF ⋏ CURLY LOGICAL AND

Relations

22D0 ⋐ DOUBLE SUBSET
22D1 ⋑ DOUBLE SUPERSET

Operators

22D2 ⋒ DOUBLE INTERSECTION
22D3 ⋓ DOUBLE UNION

Relations

22D4 ⋔ PITCHFORK
= proper intersection

22D5 ⋕ EQUAL AND PARALLEL TO
→ 2317 ⌗ viewdata square

22D6 ⋖ LESS-THAN WITH DOT
22D7 ⋗ GREATER-THAN WITH DOT
22D8 ⋘ VERY MUCH LESS-THAN
22D9 ⋙ VERY MUCH GREATER-THAN
22DA ⋚ LESS-THAN EQUAL TO OR GREATER-THAN
~ 22DA FE00 ⋚ with slanted equal

22DB ⋛ GREATER-THAN EQUAL TO OR LESS-THAN
~ 22DB FE00 ⋛ with slanted equal

22DC ≼ EQUAL TO OR LESS-THAN
~ 22DC FE00 ≼ with horizontal equal

22DD ≽ EQUAL TO OR GREATER-THAN
~ 22DD FE00 ≽ with horizontal equal

22DE ⋞ EQUAL TO OR PRECEDES

22DF ⋟ EQUAL TO OR SUCCEEDS

22E0 ⋠ DOES NOT PRECEDE OR EQUAL
≡ 227C ≼ 0338 ̸

22E1 ⋡ DOES NOT SUCCEED OR EQUAL
≡ 227D ≽ 0338 ̸

22E2 ⋢ NOT SQUARE IMAGE OF OR EQUAL TO
≡ 2291 ⊑ 0338 ̸

22E3 ⋣ NOT SQUARE ORIGINAL OF OR EQUAL TO
≡ 2292 ⊒ 0338 ̸

22E4 ⋤ SQUARE IMAGE OF OR NOT EQUAL TO
22E5 ⋥ SQUARE ORIGINAL OF OR NOT EQUAL TO
22E6 ⋦ LESS-THAN BUT NOT EQUIVALENT TO
22E7 ⋧ GREATER-THAN BUT NOT EQUIVALENT TO
22E8 ⋨ PRECEDES BUT NOT EQUIVALENT TO
22E9 ⋩ SUCCEEDS BUT NOT EQUIVALENT TO
22EA ⋪ NOT NORMAL SUBGROUP OF
≡ 22B2 ⊲ 0338 ̸

22EB ⋫ DOES NOT CONTAIN AS NORMAL SUBGROUP
≡ 22B3 ⊳ 0338 ̸

22EC ⋬ NOT NORMAL SUBGROUP OF OR EQUAL TO
≡ 22B4 ⊴ 0338 ̸

22ED ⋭ DOES NOT CONTAIN AS NORMAL SUBGROUP OR EQUAL
≡ 22B5 ⊵ 0338 ̸

Matrix ellipses

These four ellipsis characters are used for matrix row/column elision.

22EE ⋮ VERTICAL ELLIPSIS
→ 205D ⁝ tricolon
→ 2026 … horizontal ellipsis
→ FE19 ︙ presentation form for vertical horizontal ellipsis

22EF ⋯ MIDLINE HORIZONTAL ELLIPSIS
22F0 ⋰ UP RIGHT DIAGONAL ELLIPSIS
22F1 ⋱ DOWN RIGHT DIAGONAL ELLIPSIS

Relations

22F2 ⋲ ELEMENT OF WITH LONG HORIZONTAL STROKE
22F3 ⋳ ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22F4 ⋴ SMALL ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22F5 ⋵ ELEMENT OF WITH DOT ABOVE
22F6 ⋶ ELEMENT OF WITH OVERBAR
22F7 ⋷ SMALL ELEMENT OF WITH OVERBAR
22F8 ⋸ ELEMENT OF WITH UNDERBAR
22F9 ⋹ ELEMENT OF WITH TWO HORIZONTAL STROKES
22FA ⋺ CONTAINS WITH LONG HORIZONTAL STROKE
22FB ⋻ CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22FC ⋼ SMALL CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22FD ⋽ CONTAINS WITH OVERBAR
22FE ⋾ SMALL CONTAINS WITH OVERBAR
22FF ⋿ Z NOTATION BAG MEMBERSHIP

Standardized Variation Sequences

2205	⦰	EMPTY SET
		2205
	⦰	zero with long diagonal stroke overlay form
		2205 FE00
2229	∩	INTERSECTION
		2229
	∩	with serifs
		2229 FE00
222A	∪	UNION
		222A
	∪	with serifs
		222A FE00
223D	∽	REVERSED TILDE
		223D
	∽	using lazy S
		223D FE00
2242	≂	MINUS TILDE
		2242
	≂	using lazy S
		2242 FE00
2243	≃	ASYMPTOTICALLY EQUAL TO
		2243
	≃	using lazy S
		2243 FE00
2248	≈	ALMOST EQUAL TO
		2248
	≈	using lazy S
		2248 FE00
2268	≨	LESS-THAN BUT NOT EQUAL TO
		2268
	≨	with vertical stroke
		2268 FE00
2269	≩	GREATER-THAN BUT NOT EQUAL TO
		2269
	≩	with vertical stroke
		2269 FE00

2272	≲	LESS-THAN OR EQUIVALENT TO
		2272
	≲	following the slant of the lower leg
		2272 FE00
2273	≳	GREATER-THAN OR EQUIVALENT TO
		2273
	≳	following the slant of the lower leg
		2273 FE00
228A	⊊	SUBSET OF WITH NOT EQUAL TO
		228A
	⊊	with stroke through bottom members
		228A FE00
228B	⊋	SUPERSET OF WITH NOT EQUAL TO
		228B
	⊋	with stroke through bottom members
		228B FE00
2293	⊓	SQUARE CAP
		2293
	⊓	with serifs
		2293 FE00
2294	⊔	SQUARE CUP
		2294
	⊔	with serifs
		2294 FE00
2295	⊕	CIRCLED PLUS
		2295
	⊕	with white rim
		2295 FE00
2297	⊗	CIRCLED TIMES
		2297
	⊗	with white rim
		2297 FE00
229C	⊜	CIRCLED EQUALS
		229C
	⊜	with equal sign touching the circle
		229C FE00

22CD	⊴	REVERSED TILDE EQUALS
	22CD	
		using lazy S
	22CD FE00	
22DA		LESS-THAN EQUAL TO OR GREATER-THAN
	22DA	
		with slanted equal
	22DA FE00	
22DB		GREATER-THAN EQUAL TO OR LESS-THAN
	22DB	
		with slanted equal
	22DB FE00	
22DC		EQUAL TO OR LESS-THAN
	22DC	
		with horizontal equal
	22DC FE00	
22DD		EQUAL TO OR GREATER-THAN
	22DD	
		with horizontal equal
	22DD FE00	