

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 5.0*.

This file may be changed at any time without notice to reflect errata or other updates to the Unicode Standard.
See <http://www.unicode.org/errata/> for an up-to-date list of errata.

See <http://www.unicode.org/charts/> for access to a complete list of the latest character code charts.
See <http://www.unicode.org/charts/PDF/Unicode-5.0/> for charts showing only the characters added in Unicode 5.0.
See <http://www.unicode.org/Public/5.0.0/charts/> for a complete archived file of character code charts for Unicode 5.0.

Disclaimer

These charts are provided as the on-line reference to the character contents of the Unicode Standard, Version 5.0 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 5.0 (ISBN 0-321-48091-0), online at <http://www.unicode.org/versions/Unicode5.0.0/>, as well as Unicode Standard Annexes #9, #11, #14, #15, #24, #29, #31, and #34, the other Unicode Technical Reports and Standards, and the Unicode Character Database, which are available on-line.

See <http://www.unicode.org/ucd/> and <http://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. The particular fonts used in these charts were provided to the Unicode Consortium by a number of different font designers, who own the rights to the fonts.

See <http://www.unicode.org/charts/fonts.html> for a list.

Terms of Use

































































































































































































































































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	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 \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 of sets
→ 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 \beth SMALL CONTAINS AS MEMBER
→ 03F6 \beth 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

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 double-struck n-ary summation

Operators

- 2212 $-$ MINUS SIGN
→ 002D $-$ hyphen-minus

- 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
- 2216 \setminus SET MINUS
→ 005C \setminus reverse solidus
- 2217 $*$ ASTERISK OPERATOR
→ 002A $*$ asterisk
- 2218 \circ RING OPERATOR
= composite function
= APL jot
→ 00B0 $^\circ$ degree sign
→ 25E6 \circ white bullet
- 2219 \bullet BULLET OPERATOR
→ 00B7 \cdot middle dot
→ 2022 \bullet bullet
→ 2024 \cdot one dot leader
- 221A $\sqrt{}$ SQUARE ROOT
= radical sign
→ 2713 \checkmark check mark
- 221B $\sqrt[3]{}$ CUBE ROOT
- 221C $\sqrt[4]{}$ FOURTH ROOT
- 221D \propto PROPORTIONAL TO
→ 03B1 α greek small letter alpha

Miscellaneous mathematical symbols

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

Operators

- 2223 $|$ DIVIDES
= such that
= APL stile
→ 007C $|$ vertical line
→ 01C0 $|$ latin letter dental click
- 2224 \nmid DOES NOT DIVIDE
≡ 2223 $|$ 0338 $\not|$
- 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 \wedge n-ary logical and
→ 2303 \wedge up arrowhead
- 2228 \vee LOGICAL OR
= vee, disjunction
→ 22C1 \vee n-ary logical or
→ 2304 \vee down arrowhead
- 2229 \cap INTERSECTION
= cap, hat
→ 22C2 \cap n-ary intersection
- 222A \cup UNION
= cup
→ 22C3 \cup n-ary union

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	$\int\limits_{\circlearrowright}$	CLOCKWISE INTEGRAL
2232	$\int\limits_{\circlearrowleft}$	CLOCKWISE CONTOUR INTEGRAL
2233	$\int\limits_{\circlearrowleft}$	ANTICLOCKWISE CONTOUR INTEGRAL • clockwise or anticlockwise arrows do not reverse during layout mirroring

Miscellaneous mathematical symbols

2234	\therefore	THEREFORE
2235	\because	BECAUSE

Relations

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

Operator

2238	$\dot{-}$	DOT MINUS = saturating subtraction
------	-----------	---------------------------------------

Relation

2239	$:-$	EXCESS
------	------	--------

Operator

223A	\simeq	GEOMETRIC PROPORTION
------	----------	----------------------

Relations

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

Miscellaneous mathematical symbol

223F	\sim	SINE WAVE = alternating current
------	--------	------------------------------------

Operator

2240	\wr	WREATH PRODUCT
------	-------	----------------

Relations

2241	\napprox	NOT TILDE ≈ 223C \sim 0338 $\not\sim$
2242	\approx	MINUS TILDE
2243	\asymp	ASYMPTOTICALLY EQUAL TO
2244	\nasymp	NOT ASYMPTOTICALLY EQUAL TO ≈ 2243 \asymp 0338 $\not\asymp$
2245	\approx	APPROXIMATELY EQUAL TO
2246	\approx	APPROXIMATELY BUT NOT ACTUALLY EQUAL TO
2247	\napprox	NEITHER APPROXIMATELY NOR ACTUALLY EQUAL TO ≈ 2245 \approx 0338 $\not\approx$
2248	\approx	ALMOST EQUAL TO = asymptotic to
2249	\napprox	NOT ALMOST EQUAL TO ≈ 2248 \approx 0338 $\not\approx$
224A	\approx	ALMOST EQUAL OR EQUAL TO
224B	\approx	TRIPLE TILDE
224C	\approx	ALL EQUAL TO • reversed tilde and lazy S are glyph variants
224D	\asymp	EQUIVALENT TO
224E	\asymp	GEOMETRICALLY EQUIVALENT TO
224F	\asymp	DIFFERENCE BETWEEN
2250	\asymp	APPROACHES THE LIMIT
2251	\asymp	GEOMETRICALLY EQUAL TO
2252	\asymp	APPROXIMATELY EQUAL TO OR THE IMAGE OF = nearly equals
2253	\asymp	IMAGE OF OR APPROXIMATELY EQUAL TO
2254	\asymp	COLON EQUALS
2255	\asymp	EQUALS COLON
2256	\asymp	RING IN EQUAL TO
2257	\asymp	RING EQUAL TO = approximately equal to
2258	\asymp	CORRESPONDS TO
2259	\asymp	ESTIMATES = corresponds to
225A	\asymp	EQUIANGULAR TO
225B	\asymp	STAR EQUALS
225C	\asymp	DELTA EQUAL TO = equiangular = equal to by definition
225D	\asymp	EQUAL TO BY DEFINITION
225E	\asymp	MEASURED BY
225F	\asymp	QUESTIONED EQUAL TO
2260	\napprox	NOT EQUAL TO → 003D = equals sign → 01C2 \napprox latin letter alveolar click ≈ 003D = 0338 $\not\approx$
2261	\equiv	IDENTICAL TO
2262	\ncong	NOT IDENTICAL TO ≈ 2261 \equiv 0338 $\not\equiv$
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	\nless	LESS-THAN BUT NOT EQUAL TO
2269	\nless	GREATER-THAN BUT NOT EQUAL TO
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	∅	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
2273	≥	GREATER-THAN OR EQUIVALENT TO
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
2283	⊃	SUPERSET OF = includes in set
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
228B	⊇	SUPERSET OF WITH NOT EQUAL TO

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
2294	⊂	SQUARE CUP
2295	⊕	CIRCLED PLUS = direct sum = vector pointing into page → 2641 ⋈ earth → 2A01 ⊕ n-ary circled plus operator
2296	⊖	CIRCLED MINUS = symmetric difference → 29B5 ⊖ circle with horizontal bar
2297	⊗	CIRCLED TIMES = tensor product = vector pointing into page → 2A02 ⊗ n-ary circled times operator
2298	⊘	CIRCLED DIVISION SLASH
2299	⊙	CIRCLED DOT OPERATOR = direct product = vector pointing out of page → 0298 ⊙ 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
229D	⊖	CIRCLED DASH
229E	⊕	SQUARED PLUS
229F	⊖	SQUARED MINUS
22A0	⊗	SQUARED TIMES → 2612 ⊗ ballot box with x
22A1	⊂	SQUARED DOT OPERATOR
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 ⊢ raised interpolation marker
22A5	⊥	UP TACK = base, bottom → 27C2 ⊥ perpendicular

Relations

22A6	⊢	ASSERTION = reduces to
22A7	⊢	MODELS

22A8	\models	TRUE = statement is true, valid = is a tautology = satisfies = results in
22A9	\Vdash	FORCES
22AA	\Vdash	TRIPLE VERTICAL BAR RIGHT TURNSTILE
22AB	\Vdash	DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE
22AC	\nVdash	DOES NOT PROVE $\equiv 22A2 \vdash 0338 \not\vdash$
22AD	\nVdash	NOT TRUE $\equiv 22A8 \models 0338 \not\models$
22AE	\nVdash	DOES NOT FORCE $\equiv 22A9 \Vdash 0338 \not\Vdash$
22AF	\nVdash	NEGATED DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE $\equiv 22AB \Vdash 0338 \not\Vdash$
22B0	\prec	PRECEDES UNDER RELATION $\rightarrow 227A < \text{precedes}$
22B1	\succ	SUCCEEDS UNDER RELATION $\rightarrow 227B > \text{succeeds}$
22B2	\triangleleft	NORMAL SUBGROUP OF $\rightarrow 25C5 \triangleleft \text{white left-pointing pointer}$
22B3	\triangleright	CONTAINS AS NORMAL SUBGROUP $\rightarrow 25BB \triangleright \text{white right-pointing pointer}$
22B4	\trianglelefteq	NORMAL SUBGROUP OF OR EQUAL TO
22B5	\trianglerighteq	CONTAINS AS NORMAL SUBGROUP OR EQUAL TO
22B6	\mapsto	ORIGINAL OF
22B7	\mapsto	IMAGE OF
22B8	\multimap	MULTIMAP
22B9	\dagger	HERMITIAN CONJUGATE MATRIX

Operators

22BA	\intercal	INTERCALATE
22BB	$\underline{\vee}$	XOR
22BC	$\overline{\wedge}$	NAND $\rightarrow 2305 \overline{\wedge} \text{projective}$
22BD	∇	NOR

Miscellaneous mathematical symbols

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

N-ary operators

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

Operators

22C4	\diamond	DIAMOND OPERATOR $\rightarrow 25C7 \diamond \text{white diamond}$
22C5	\cdot	DOT OPERATOR $\rightarrow 00B7 \cdot \text{middle dot}$

22C6	\star	STAR OPERATOR • APL $\rightarrow 066D \star \text{arabic five pointed star}$ $\rightarrow 2605 \blackstar \text{black star}$
22C7	\div	DIVISION TIMES

Relation

22C8	\bowtie	BOWTIE $\rightarrow 2445 \bowtie \text{ocr bow tie}$
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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 $\rightarrow 2041 \text{caret insertion point}$

Relation

22CD	\approx	REVERSED TILDE EQUALS
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Logical operators

22CE	\vee	CURLY LOGICAL OR
22CF	\wedge	CURLY LOGICAL AND

Relations

22D0	\subseteq	DOUBLE SUBSET
22D1	\supseteq	DOUBLE SUPERSET

Operators

22D2	\cap	DOUBLE INTERSECTION
22D3	\cup	DOUBLE UNION

Relations

22D4	\pitchfork	PITCHFORK = proper intersection
22D5	$\#$	EQUAL AND PARALLEL TO $\rightarrow 2317 \# \text{viewdata square}$
22D6	\triangleleft	LESS-THAN WITH DOT
22D7	\triangleright	GREATER-THAN WITH DOT
22D8	\ll	VERY MUCH LESS-THAN
22D9	\gg	VERY MUCH GREATER-THAN
22DA	\equiv	LESS-THAN EQUAL TO OR GREATER-THAN
22DB	\equiv	GREATER-THAN EQUAL TO OR LESS-THAN
22DC	\approx	EQUAL TO OR LESS-THAN
22DD	\approx	EQUAL TO OR GREATER-THAN
22DE	\preceq	EQUAL TO OR PRECEDES
22DF	\succeq	EQUAL TO OR SUCCEEDS
22E0	\nprec	DOES NOT PRECEDE OR EQUAL $\equiv 227C \preceq 0338 \not\preceq$
22E1	$\n\succeq$	DOES NOT SUCCEED OR EQUAL $\equiv 227D \succeq 0338 \not\succeq$
22E2	\sqsubseteq	NOT SQUARE IMAGE OF OR EQUAL TO $\equiv 2291 \sqsubseteq 0338 \not\sqsubseteq$
22E3	\sqsupseteq	NOT SQUARE ORIGINAL OF OR EQUAL TO $\equiv 2292 \sqsupseteq 0338 \not\sqsupseteq$
22E4	\sqsubset	SQUARE IMAGE OF OR NOT EQUAL TO
22E5	\sqsupset	SQUARE ORIGINAL OF OR NOT EQUAL TO
22E6	\leq	LESS-THAN BUT NOT EQUIVALENT TO
22E7	\geq	GREATER-THAN BUT NOT EQUIVALENT TO
22E8	\preceq	PRECEDES BUT NOT EQUIVALENT TO
22E9	\succeq	SUCCEEDS BUT NOT EQUIVALENT TO
22EA	\ntriangleleft	NOT NORMAL SUBGROUP OF $\equiv 22B2 \triangleleft 0338 \not\triangleleft$
22EB	\ntriangleright	DOES NOT CONTAIN AS NORMAL SUBGROUP $\equiv 22B3 \triangleright 0338 \not\triangleright$

22EC	\ncong	NOT NORMAL SUBGROUP OF OR EQUAL TO \equiv 22B4 \trianglelefteq 0338 $\not\cong$
22ED	\nsubseteq	DOES NOT CONTAIN AS NORMAL SUBGROUP OR EQUAL \equiv 22B5 \supsetneq 0338 $\not\subseteq$
22EE	\vdots	VERTICAL ELLIPSIS • these four ellipses are used for matrix row/column elision → 205D $\mathbin{\text{⋮}}$ tricolon → 2026 \dots horizontal ellipsis → FE19 $\mathbin{\text{⋮}}$ presentation form for vertical horizontal ellipsis
22EF	\cdots	MIDLINE HORIZONTAL ELLIPSIS
22F0	$\cdot\cdot\cdot$	UP RIGHT DIAGONAL ELLIPSIS
22F1	$\cdot\cdot\cdot$	DOWN RIGHT DIAGONAL ELLIPSIS
22F2	\E	ELEMENT OF WITH LONG HORIZONTAL STROKE
22F3	\E	ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22F4	\e	SMALL ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22F5	\E	ELEMENT OF WITH DOT ABOVE
22F6	\E	ELEMENT OF WITH OVERBAR
22F7	\e	SMALL ELEMENT OF WITH OVERBAR
22F8	\E	ELEMENT OF WITH UNDERBAR
22F9	\E	ELEMENT OF WITH TWO HORIZONTAL STROKES
22FA	\supset	CONTAINS WITH LONG HORIZONTAL STROKE
22FB	\supset	CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22FC	\supset	SMALL CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22FD	\supset	CONTAINS WITH OVERBAR
22FE	\supset	SMALL CONTAINS WITH OVERBAR
22FF	\E	Z NOTATION BAG MEMBERSHIP