

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 8.0

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-8.0/> for charts showing only the characters added in Unicode 8.0.
See <http://www.unicode.org/Public/8.0.0/charts/> for a complete archived file of character code charts for Unicode 8.0.

Disclaimer

These charts are provided as the online reference to the character contents of the Unicode Standard, Version 8.0 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 8.0, online at <http://www.unicode.org/versions/Unicode8.0.0/>, as well as Unicode Standard Annexes #9, #11, #14, #15, #24, #29, #31, #34, #38, #41, #42, #44, and #45, the other Unicode Technical Reports and Standards, and the Unicode Character Database, which are available online.

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.

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

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



























































































































































































































































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See <http://www.unicode.org/pending/pending.html> and <http://www.unicode.org/alloc/Pipeline.html>.

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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 (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 \nsubseteq **DOES NOT CONTAIN AS MEMBER**
≡ 220B \ni 0338 $\not\subseteq$
- 220D \supset **SMALL CONTAINS AS MEMBER**
→ 03F6 \supset 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 $\sum\limits$ 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 \backslash **SET MINUS**
→ 005C \backslash reverse solidus
→ 27CD \backslash mathematical falling diagonal
→ 29F5 \backslash 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 \bullet white bullet
→ 10B39 $^\circ$ avestan abbreviation mark
- 2219 \cdot **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**
→ 0606 $\sqrt[3]{}$ arabic-indic cube root
- 221C $\sqrt[4]{}$ **FOURTH ROOT**
→ 0607 $\sqrt[4]{}$ arabic-indic fourth root
- 221D \propto **PROPORTIONAL TO**
→ 03B1 \propto greek small letter alpha

Miscellaneous mathematical symbol

- 221E ∞ **INFINITY**

Angles

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

- 221F \angle **RIGHT ANGLE**
- 2220 \sphericalangle **ANGLE**
→ 299F \sphericalangle acute angle
- 2221 \sphericalangle **MEASURED ANGLE**
- 2222 \sphericalangle **SPHERICAL ANGLE**
= angle arc

Relations

- 2223 $|$ **DIVIDES**
= such that
= APL stile
→ 007C $|$ vertical line
→ 01C0 $|$ latin letter dental click
- 2224 \nmid **DOES NOT DIVIDE**
≡ 2223 $|$ 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 \wedge 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 $\int\limits^{\circlearrowright}$ CLOCKWISE INTEGRAL
- 2232 $\int\limits^{\circlearrowleft}$ CLOCKWISE CONTOUR INTEGRAL
- 2233 $\int\limits^{\circlearrowright}$ 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
• preferred to 003A $:$ for denotation of division or scale in mathematical use
→ 003A $:$ colon
- 2237 $::$ PROPORTION

Operator

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

Relation

- 2239 \therefore EXCESS

Operator

- 223A \therefore GEOMETRIC PROPORTION

Relations

- 223B \sim HOMOTHETIC
→ 2A6B \sim 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 \neg not sign
→ 02DC \sim small tilde

- 223D \smile REVERSED TILDE
= lazy S
• reversed tilde and lazy S are glyph variants
- 223E \approx 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 \ncong MINUS TILDE
- 2243 \asymp ASYMPTOTICALLY EQUAL TO
- 2244 \nasymp NOT ASYMPTOTICALLY EQUAL TO
≡ 2243 \asymp 0338 $\not\asymp$
- 2245 \approx APPROXIMATELY EQUAL TO
- 2246 \napprox APPROXIMATELY BUT NOT ACTUALLY EQUAL TO
- 2247 \ncong 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 \equiv ALL EQUAL TO
• reversed tilde and lazy S are glyph variants
- 224D \asymp EQUIVALENT TO
- 224E \doteq GEOMETRICALLY EQUIVALENT TO
- 224F \doteq 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	$\stackrel{?}{=}$	QUESTIONED EQUAL TO
2260	\neq	NOT EQUAL TO → 003D = equals sign → 01C2 ‡ latin letter alveolar click ≡ 003D = 0338 ∅
2261	\equiv	IDENTICAL TO
2262	\ncong	NOT IDENTICAL TO ≡ 2261 ≡ 0338 ∅
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	\nlessgtr	LESS-THAN BUT NOT EQUAL TO ~ 2268 FE00 \leq with vertical stroke
2269	\ngtrless	GREATER-THAN BUT NOT EQUAL TO ~ 2269 FE00 \geq with vertical stroke
226A	\ll	MUCH LESS-THAN → 00AB « left-pointing double angle quotation mark
226B	\gg	MUCH GREATER-THAN → 00BB » right-pointing double angle quotation mark
226C	\P	BETWEEN = plaintiff, quantic
226D	\napprox	NOT EQUIVALENT TO ≡ 224D \approx 0338 ∅
226E	\nlessgtr	NOT LESS-THAN ≡ 003C < 0338 ∅
226F	\ngtrless	NOT GREATER-THAN ≡ 003E > 0338 ∅
2270	\nlessgtr	NEITHER LESS-THAN NOR EQUAL TO ≡ 2264 \leq 0338 ∅
2271	\ngtrless	NEITHER GREATER-THAN NOR EQUAL TO ≡ 2265 \geq 0338 ∅
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 ∅
2275	\ngtrless	NEITHER GREATER-THAN NOR EQUIVALENT TO ≡ 2273 \gtrsim 0338 ∅
2276	\leq	LESS-THAN OR GREATER-THAN
2277	\geq	GREATER-THAN OR LESS-THAN
2278	\nlessgtr	NEITHER LESS-THAN NOR GREATER-THAN ≡ 2276 \leq 0338 ∅
2279	\ngtrless	NEITHER GREATER-THAN NOR LESS-THAN ≡ 2277 \geq 0338 ∅
227A	$<$	PRECEDES = lower rank than → 22B0 \rightarrow precedes under relation
227B	$>$	SUCCEEDS = higher rank than → 22B1 \leftarrow succeeds under relation
227C	\leq	PRECEDES OR EQUAL TO
227D	\geq	SUCCEEDS OR EQUAL TO
227E	\lesssim	PRECEDES OR EQUIVALENT TO
227F	\gtrsim	SUCCEEDS OR EQUIVALENT TO

2280	\nlessgtr	DOES NOT PRECEDE ≡ 227A < 0338 ∅
2281	\ngtrless	DOES NOT SUCCEED ≡ 227B > 0338 ∅
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	\nsubset	NOT A SUBSET OF ≡ 2282 \subset 0338 ∅
2285	\nsupset	NOT A SUPERSET OF ≡ 2283 \supset 0338 ∅
2286	\subseteq	SUBSET OF OR EQUAL TO
2287	\supseteq	SUPERSET OF OR EQUAL TO
2288	\nsubseteq	NEITHER A SUBSET OF NOR EQUAL TO ≡ 2286 \subseteq 0338 ∅
2289	\nsupseteq	NEITHER A SUPERSET OF NOR EQUAL TO ≡ 2287 \supseteq 0338 ∅
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	\mathcal{U}	MULTISET
228D	\mathcal{U}	MULTISET MULTIPLICATION → 2A03 \mathcal{U} n-ary union operator with dot → 2A40 \mathcal{U} intersection with dot
228E	\mathcal{U}	MULTISET UNION = z notation bag addition → 2A04 \mathcal{U} n-ary union operator with plus

Relations

228F	\sqsubset	SQUARE IMAGE OF
2290	\sqsubset	SQUARE ORIGINAL OF
2291	\sqsubseteq	SQUARE IMAGE OF OR EQUAL TO
2292	\sqsubseteq	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 → 2A06 \sqcup n-ary square union operator ~ 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	⊗	CIRCLED TIMES = tensor product = vector pointing into page → 26D2 ⊗ circled crossing lanes → 2A02 ⊗ n-ary circled times operator → 2BBE ⊗ circled x ~ 2297 FE00 ⊗ with white rim
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 ~ 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
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 → 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

Relation

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

Operators

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

Relation

22CD \preceq REVERSED TILDE EQUALS

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
 → 2317 $\#$ viewdata square
 22D6 \lessdot LESS-THAN WITH DOT
 22D7 \gtrdot GREATER-THAN WITH DOT
 22D8 \lll VERY MUCH LESS-THAN
 22D9 \ggg VERY MUCH GREATER-THAN
 22DA \lesseqgtr LESS-THAN EQUAL TO OR GREATER-THAN
 ~ 22DA FE00 \lesseqgtr with slanted equal
 22DB \gtrlessgtr GREATER-THAN EQUAL TO OR LESS-THAN
 ~ 22DB FE00 \gtrlessgtr with slanted equal
 22DC \lessgtr EQUAL TO OR LESS-THAN
 22DD \gtrless EQUAL TO OR GREATER-THAN
 22DE \lessgtr EQUAL TO OR PRECEDES
 22DF \gtrless EQUAL TO OR SUCCEEDS
 22E0 \nprec DOES NOT PRECEDE OR EQUAL
 ≡ 227C \leq 0338 \nprec
 22E1 \nsucc DOES NOT SUCCEED OR EQUAL
 ≡ 227D \geq 0338 \nsucc
 22E2 \nsubseteq NOT SQUARE IMAGE OF OR EQUAL TO
 ≡ 2291 \sqsubseteq 0338 \nsubseteq
 22E3 \nsupseteq NOT SQUARE ORIGINAL OF OR EQUAL TO
 ≡ 2292 \sqsupseteq 0338 \nsupseteq
 22E4 \sqsubset SQUARE IMAGE OF OR NOT EQUAL TO
 22E5 \sqsupset SQUARE ORIGINAL OF OR NOT EQUAL TO
 22E6 \lessdot LESS-THAN BUT NOT EQUIVALENT TO
 22E7 \gtrdot GREATER-THAN BUT NOT EQUIVALENT TO
 22E8 \lessgtr PRECEDES BUT NOT EQUIVALENT TO
 22E9 \gtrless SUCCEEDS BUT NOT EQUIVALENT TO
 22EA \ntriangleleft NOT NORMAL SUBGROUP OF
 ≡ 22B2 \triangleleft 0338 \ntriangleleft
 22EB \ntriangleleft DOES NOT CONTAIN AS NORMAL SUBGROUP
 ≡ 22B3 \triangleright 0338 \ntriangleleft
 22EC \ntrianglelefteq NOT NORMAL SUBGROUP OF OR EQUAL TO
 ≡ 22B4 \trianglelefteq 0338 \ntrianglelefteq

22ED \ncong DOES NOT CONTAIN AS NORMAL SUBGROUP OR EQUAL
 ≡ 22B5 \supseteq 0338 \ncong

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 \cdots MIDLINE HORIZONTAL ELLIPSIS

22F0 \therefore UP RIGHT DIAGONAL ELLIPSIS

22F1 \therefore 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 \supsetneq CONTAINS WITH LONG HORIZONTAL STROKE

22FB \supsetneq CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE

22FC \supsetneq SMALL CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE

22FD \supsetneq CONTAINS WITH OVERBAR

22FE \supsetneq SMALL CONTAINS WITH OVERBAR

22FF \E Z NOTATION BAG MEMBERSHIP