

## **Mathematical Operators**

**Range: 2200–22FF**

### **The Unicode Standard, Version 3.2**

This file contains an excerpt from the character code tables and list of character names for *The Unicode Standard, Version 3.2*.

Characters in this chart that are new for The Unicode Standard, Version 3.2 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 <http://www.unicode.org/charts> for access to a complete list of the latest character charts.

### **Disclaimer**

These charts are provided as the on-line reference to the character contents of the Unicode Standard, Version 3.2 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 excerpt file, please consult the appropriate sections of The Unicode Standard, Version 3.0 (ISBN 0-201-61633-5), as well as Unicode Standard Annexes #28 and #27, the other Unicode Technical Reports and the Unicode Character Database, which are available on-line.

See <http://www.unicode.org/Public/UNIDATA/UnicodeCharacterDatabase.html> and <http://www.unicode.org/unicode/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/unicode/uni2book/u2fonts.html> for a list.

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

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	220	221	222	223	224	225	226	227
0	$\nabla$ 2200	$\sqcup$ 2210	$\sphericalangle$ 2220	$\mathfrak{F}$ 2230	$\wr$ 2240	$\doteq$ 2250	$\neq$ 2260	$\not\approx$ 2270
1	$\complement$ 2201	$\Sigma$ 2211	$\Delta$ 2221	$\mathfrak{f}$ 2231	$\approx$ 2241	$\div$ 2251	$\equiv$ 2261	$\not\equiv$ 2271
2	$\partial$ 2202	$-$ 2212	$\nlessgtr$ 2222	$\mathfrak{f}$ 2232	$\approx$ 2242	$\doteq$ 2252	$\neq$ 2262	$\approx$ 2272
3	$\exists$ 2203	$\mp$ 2213	$ $ 2223	$\mathfrak{f}$ 2233	$\approx$ 2243	$\doteq$ 2253	$\equiv$ 2263	$\approx$ 2273
4	$\cancel{A}$ 2204	$\dagger$ 2214	$\ddagger$ 2224	$\therefore$ 2234	$\neq$ 2244	$\doteq$ 2254	$\leq$ 2264	$\not\approx$ 2274
5	$\emptyset$ 2205	$/$ 2215	$\parallel$ 2225	$\therefore$ 2235	$\equiv$ 2245	$\doteq$ 2255	$\geq$ 2265	$\not\approx$ 2275
6	$\Delta$ 2206	$\diagdown$ 2216	$\mathfrak{K}$ 2226	$:$ 2236	$\neq$ 2246	$\mathfrak{H}$ 2256	$\equiv$ 2266	$\approx$ 2276
7	$\nabla$ 2207	$*$ 2217	$\wedge$ 2227	$\therefore$ 2237	$\neq$ 2247	$\doteq$ 2257	$\equiv$ 2267	$\approx$ 2277
8	$\in$ 2208	$\circ$ 2218	$\vee$ 2228	$\dot{-}$ 2238	$\approx$ 2248	$\equiv$ 2258	$\neq$ 2268	$\not\approx$ 2278
9	$\notin$ 2209	$\bullet$ 2219	$\cap$ 2229	$\dot{-}$ 2239	$\neq$ 2249	$\triangleq$ 2259	$\neq$ 2269	$\not\approx$ 2279
A	$\epsilon$ 220A	$\sqrt{\quad}$ 221A	$\cup$ 222A	$\doteq$ 223A	$\equiv$ 224A	$\leq$ 225A	$\ll$ 226A	$\prec$ 227A
B	$\supseteq$ 220B	$\sqrt[3]{\quad}$ 221B	$\int$ 222B	$\div$ 223B	$\equiv$ 224B	$\star$ 225B	$\gg$ 226B	$\succ$ 227B
C	$\cancel{A}$ 220C	$\sqrt[4]{\quad}$ 221C	$\iint$ 222C	$\sim$ 223C	$\equiv$ 224C	$\triangleq$ 225C	$\emptyset$ 226C	$\succ$ 227C
D	$\ni$ 220D	$\infty$ 221D	$\iiint$ 222D	$\sim$ 223D	$\asymp$ 224D	$\stackrel{\text{def}}{=}$ 225D	$\neq$ 226D	$\approx$ 227D
E	$\blacksquare$ 220E	$\infty$ 221E	$\mathfrak{f}$ 222E	$\approx$ 223E	$\mathfrak{P}$ 224E	$\equiv$ 225E	$\neq$ 226E	$\approx$ 227E
F	$\prod$ 220F	$\perp$ 221F	$\mathfrak{F}$ 222F	$\approx$ 223F	$\mathfrak{P}$ 224F	$\stackrel{?}{=}$ 225F	$\neq$ 226F	$\approx$ 227F

	228	229	22A	22B	22C	22D	22E	22F
0	2280	2290	22A0	22B0	22C0	22D0	22E0	22F0
1	2281	2291	22A1	22B1	22C1	22D1	22E1	22F1
2	2282	2292	22A2	22B2	22C2	22D2	22E2	22F2
3	2283	2293	22A3	22B3	22C3	22D3	22E3	22F3
4	2284	2294	22A4	22B4	22C4	22D4	22E4	22F4
5	2285	2295	22A5	22B5	22C5	22D5	22E5	22F5
6	2286	2296	22A6	22B6	22C6	22D6	22E6	22F6
7	2287	2297	22A7	22B7	22C7	22D7	22E7	22F7
8	2288	2298	22A8	22B8	22C8	22D8	22E8	22F8
9	2289	2299	22A9	22B9	22C9	22D9	22E9	22F9
A	228A	229A	22AA	22BA	22CA	22DA	22EA	22FA
B	228B	229B	22AB	22BB	22CB	22DB	22EB	22FB
C	228C	229C	22AC	22BC	22CC	22DC	22EC	22FC
D	228D	229D	22AD	22BD	22CD	22DD	22ED	22FD
E	228E	229E	22AE	22BE	22CE	22DE	22EE	22FE
F	228F	229F	22AF	22BF	22CF	22DF	22EF	22FF

**Mathematical operators**

2200	$\forall$	FOR ALL	2215	/	DIVISION SLASH • generic division operator → 002F / solidus → 2044 / fraction slash
2201	$\complement$	COMPLEMENT → 0297 $\complement$ latin letter stretched c	2216	$\setminus$	SET MINUS → 005C $\setminus$ reverse solidus
2202	$\partial$	PARTIAL DIFFERENTIAL	2217	*	ASTERISK OPERATOR → 002A * asterisk
2203	$\exists$	THERE EXISTS	2218	$\circ$	RING OPERATOR = composite function = APL jot → 00B0 $\circ$ degree sign → 25E6 $\circ$ white bullet
2204	$\nexists$	THERE DOES NOT EXIST ≡ 2203 $\exists$ 0338 $\not\exists$	2219	$\bullet$	BULLET OPERATOR → 00B7 $\bullet$ middle dot → 2022 $\bullet$ bullet → 2024 $\cdot$ one dot leader
2205	$\emptyset$	EMPTY SET = null set → 00D8 $\emptyset$ latin capital letter o with stroke → 2300 $\emptyset$ diameter sign	221A	$\sqrt{\quad}$	SQUARE ROOT = radical sign → 2713 $\checkmark$ check mark
2206	$\Delta$	INCREMENT = Laplace operator = forward difference → 0394 $\Delta$ greek capital letter delta → 25B3 $\Delta$ white up-pointing triangle	221B	$\sqrt[3]{\quad}$	CUBE ROOT
2207	$\nabla$	NABLA = Laplace operator (written with superscript 2) = backward difference = del → 25BD $\nabla$ white down-pointing triangle	221C	$\sqrt[4]{\quad}$	FOURTH ROOT
2208	$\in$	ELEMENT OF	221D	$\propto$	PROPORTIONAL TO → 03B1 $\alpha$ greek small letter alpha
2209	$\notin$	NOT AN ELEMENT OF ≡ 2208 $\in$ 0338 $\not\in$	221E	$\infty$	INFINITY
220A	$\epsilon$	SMALL ELEMENT OF • originates in math pi fonts; not the straight epsilon → 03F5 $\epsilon$ greek lunate epsilon symbol	221F	$\perp$	RIGHT ANGLE
220B	$\ni$	CONTAINS AS MEMBER = such that	2220	$\sphericalangle$	ANGLE
220C	$\not\ni$	DOES NOT CONTAIN AS MEMBER ≡ 220B $\ni$ 0338 $\not\ni$	2221	$\sphericalangle$	MEASURED ANGLE
220D	$\ni$	SMALL CONTAINS AS MEMBER → 03F6 $\ni$ greek reversed lunate epsilon symbol	2222	$\sphericalangle$	SPHERICAL ANGLE = angle arc
220E	$\blacksquare$	END OF PROOF = Q.E.D. → 2023 $\blacktriangleright$ triangular bullet → 25AE $\blacksquare$ black vertical rectangle	2223		DIVIDES = such that = APL stile → 007C   vertical line → 01C0   latin letter dental click
220F	$\prod$	N-ARY PRODUCT = product sign → 03A0 $\prod$ greek capital letter pi	2224	$\nmid$	DOES NOT DIVIDE ≡ 2223   0338 $\not\mid$
2210	$\coprod$	N-ARY COPRODUCT = coproduct sign	2225		PARALLEL TO → 01C1    latin letter lateral click → 2016    double vertical line
2211	$\sum$	N-ARY SUMMATION = summation sign → 03A3 $\Sigma$ greek capital letter sigma	2226	$\nparallel$	NOT PARALLEL TO ≡ 2225    0338 $\not\parallel$
2212	-	MINUS SIGN → 002D - hyphen-minus	2227	$\wedge$	LOGICAL AND = wedge, conjunction → 22C0 $\wedge$ n-ary logical and → 2303 $\wedge$ up arrowhead
2213	$\mp$	MINUS-OR-PLUS SIGN → 00B1 $\pm$ plus-minus sign	2228	$\vee$	LOGICAL OR = vee, disjunction → 22C1 $\vee$ n-ary logical or → 2304 $\vee$ down arrowhead
2214	$\dot{+}$	DOT PLUS	2229	$\cap$	INTERSECTION = cap, hat → 22C2 $\cap$ n-ary intersection
			222A	$\cup$	UNION = cup → 22C3 $\cup$ n-ary union

222B	$\int$	INTEGRAL → 0283 $\int$ latin small letter esh	2248	$\approx$	ALMOST EQUAL TO = asymptotic to
222C	$\iint$	DOUBLE INTEGRAL $\approx$ 222B $\int$ 222B $\int$	2249	$\napprox$	NOT ALMOST EQUAL TO $\equiv$ 2248 $\approx$ 0338 $\not\approx$
222D	$\iiint$	TRIPLE INTEGRAL $\approx$ 222B $\int$ 222B $\int$ 222B $\int$	224A	$\cong$	ALMOST EQUAL OR EQUAL TO
222E	$\oint$	CONTOUR INTEGRAL	224B	$\equiv$	TRIPLE TILDE
222F	$\oiint$	SURFACE INTEGRAL $\approx$ 222E $\oint$ 222E $\oint$	224C	$\equiv$	ALL EQUAL TO • reversed tilde and lazy S are glyph variants
2230	$\iiint$	VOLUME INTEGRAL $\approx$ 222E $\oint$ 222E $\oint$ 222E $\oint$	224D	$\times$	EQUIVALENT TO
2231	$\int$	CLOCKWISE INTEGRAL	224E	$\simeq$	GEOMETRICALLY EQUIVALENT TO
2232	$\oint$	CLOCKWISE CONTOUR INTEGRAL	224F	$\triangleq$	DIFFERENCE BETWEEN
2233	$\oint$	ANTICLOCKWISE CONTOUR INTEGRAL • clockwise or anticlockwise arrows do not reverse during layout mirroring	2250	$\doteq$	APPROACHES THE LIMIT
2234	$\therefore$	THEREFORE	2251	$\doteq$	GEOMETRICALLY EQUAL TO
2235	$\because$	BECAUSE	2252	$\doteq$	APPROXIMATELY EQUAL TO OR THE IMAGE OF = nearly equals
2236	:	RATIO → 003A : colon	2253	$\doteq$	IMAGE OF OR APPROXIMATELY EQUAL TO
2237	::	PROPORTION	2254	$\doteq$	COLON EQUALS
2238	$\dot{-}$	DOT MINUS = symmetric difference	2255	$\doteq$	EQUALS COLON
2239	$\therefore$	EXCESS	2256	$\doteq$	RING IN EQUAL TO
223A	$\doteq$	GEOMETRIC PROPORTION	2257	$\doteq$	RING EQUAL TO = approximately equal to
223B	$\doteq$	HOMOTHETIC	2258	$\doteq$	CORRESPONDS TO
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	2259	$\doteq$	ESTIMATES = corresponds to
223D	$\sim$	REVERSED TILDE = lazy S • reversed tilde and lazy S are glyph variants	225A	$\doteq$	EQUIANGULAR TO
223E	$\sim$	INVERTED LAZY S = most positive	225B	$\doteq$	STAR EQUALS
223F	$\sim$	SINE WAVE = alternating current	225C	$\doteq$	DELTA EQUAL TO = equiangular = equal to by definition
2240	$\wr$	WREATH PRODUCT	225D	$\doteq$	EQUAL TO BY DEFINITION
2241	$\napprox$	NOT TILDE $\equiv$ 223C $\sim$ 0338 $\not\approx$	225E	$\doteq$	MEASURED BY
2242	$\approx$	MINUS TILDE	225F	$\doteq$	QUESTIONED EQUAL TO
2243	$\approx$	ASYMPTOTICALLY EQUAL TO	2260	$\neq$	NOT EQUAL TO → 003D = equals sign → 01C2 † latin letter alveolar click $\equiv$ 003D = 0338 $\not\approx$
2244	$\napprox$	NOT ASYMPTOTICALLY EQUAL TO $\equiv$ 2243 $\approx$ 0338 $\not\approx$	2261	$\equiv$	IDENTICAL TO
2245	$\cong$	APPROXIMATELY EQUAL TO	2262	$\ncong$	NOT IDENTICAL TO $\equiv$ 2261 $\equiv$ 0338 $\not\approx$
2246	$\cong$	APPROXIMATELY BUT NOT ACTUALLY EQUAL TO	2263	$\equiv$	STRICTLY EQUIVALENT TO
2247	$\ncong$	NEITHER APPROXIMATELY NOR ACTUALLY EQUAL TO $\equiv$ 2245 $\cong$ 0338 $\not\approx$	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
			2269	$\geq$	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	$\diamond$	BETWEEN = plaintiff, quantic

226D	≠	NOT EQUIVALENT TO ≡ 224D ≠ 0338 $\not\equiv$	228A	⊆	SUBSET OF WITH NOT EQUAL TO
226E	⋈	NOT LESS-THAN ≡ 003C < 0338 $\not\equiv$	228B	⊇	SUPERSET OF WITH NOT EQUAL TO
226F	⋉	NOT GREATER-THAN ≡ 003E > 0338 $\not\equiv$	228C	⊎	MULTISET
2270	≠	NEITHER LESS-THAN NOR EQUAL TO ≡ 2264 ≤ 0338 $\not\equiv$	228D	⊗	MULTISET MULTIPLICATION
2271	≧	NEITHER GREATER-THAN NOR EQUAL TO ≡ 2265 ≥ 0338 $\not\equiv$	228E	⊕	MULTISET UNION = z notation bag addition
2272	≦	LESS-THAN OR EQUIVALENT TO	228F	□	SQUARE IMAGE OF
2273	≧	GREATER-THAN OR EQUIVALENT TO	2290	◻	SQUARE ORIGINAL OF
2274	≠	NEITHER LESS-THAN NOR EQUIVALENT TO ≡ 2272 ≤ 0338 $\not\equiv$	2291	◻	SQUARE IMAGE OF OR EQUAL TO
2275	≧	NEITHER GREATER-THAN NOR EQUIVALENT TO ≡ 2273 ≥ 0338 $\not\equiv$	2292	◻	SQUARE ORIGINAL OF OR EQUAL TO
2276	≦	LESS-THAN OR GREATER-THAN	2293	◻	SQUARE CAP
2277	≧	GREATER-THAN OR LESS-THAN	2294	◻	SQUARE CUP
2278	≠	NEITHER LESS-THAN NOR GREATER- THAN ≡ 2276 ≤ 0338 $\not\equiv$	2295	⊕	CIRCLED PLUS = direct sum = vector pointing into page → 2641 ♂ earth
2279	≧	NEITHER GREATER-THAN NOR LESS- THAN ≡ 2277 ≥ 0338 $\not\equiv$	2296	⊖	CIRCLED MINUS = symmetric difference
227A	<	PRECEDES = lower rank than → 22B0 ⋈ precedes under relation	2297	⊗	CIRCLED TIMES = tensor product = vector pointing into page
227B	>	SUCCEEDS = higher rank than → 22B1 ⋉ succeeds under relation	2298	⊘	CIRCLED DIVISION SLASH
227C	≦	PRECEDES OR EQUAL TO	2299	⊙	CIRCLED DOT OPERATOR = direct product = vector pointing out of page → 0298 ⊙ latin letter bilabial click → 2609 ⊙ sun
227D	≧	SUCCEEDS OR EQUAL TO	229A	⊙	CIRCLED RING OPERATOR → 233E ⊙ apl functional symbol circle jot → 25CE ⊙ bullseye
227E	≦	PRECEDES OR EQUIVALENT TO	229B	⊗	CIRCLED ASTERISK OPERATOR
227F	≧	SUCCEEDS OR EQUIVALENT TO	229C	⊖	CIRCLED EQUALS
2280	⋈	DOES NOT PRECEDE ≡ 227A < 0338 $\not\equiv$	229D	⊖	CIRCLED DASH
2281	⋉	DOES NOT SUCCEED ≡ 227B > 0338 $\not\equiv$	229E	⊕	SQUARED PLUS
2282	⊆	SUBSET OF = included in set	229F	⊖	SQUARED MINUS
2283	⊇	SUPERSET OF = includes in set	22A0	⊗	SQUARED TIMES → 2612 ⊗ ballot box with x
2284	⊈	NOT A SUBSET OF ≡ 2282 ⊆ 0338 $\not\equiv$	22A1	⊖	SQUARED DOT OPERATOR
2285	⊉	NOT A SUPERSET OF ≡ 2283 ⊇ 0338 $\not\equiv$	22A2	⊢	RIGHT TACK = turnstile = proves, implies, yields = reducible
2286	⊆	SUBSET OF OR EQUAL TO	22A3	⊣	LEFT TACK = reverse turnstile = non-theorem, does not yield
2287	⊇	SUPERSET OF OR EQUAL TO	22A4	⊤	DOWN TACK = top
2288	⊈	NEITHER A SUBSET OF NOR EQUAL TO ≡ 2286 ⊆ 0338 $\not\equiv$	22A5	⊥	UP TACK = orthogonal to = perpendicular = base, bottom
2289	⊉	NEITHER A SUPERSET OF NOR EQUAL TO ≡ 2287 ⊇ 0338 $\not\equiv$	22A6	⊢	ASSERTION = reduces to
			22A7	⊢	MODELS

22A8	$\models$	TRUE = statement is true, valid = is a tautology = satisfies = results in	22C6	*	STAR OPERATOR • APL → 066D * arabic five pointed star → 2605 ★ black star
22A9	$\Vdash$	FORCES	22C7	$\div$	DIVISION TIMES
22AA	$\equiv$	TRIPLE VERTICAL BAR RIGHT TURNSTILE	22C8	$\bowtie$	BOWTIE → 2445 ⚭ ocr bow tie
22AB	$\equiv$	DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE	22C9	$\ltimes$	LEFT NORMAL FACTOR SEMIDIRECT PRODUCT
22AC	$\nVdash$	DOES NOT PROVE ≡ 22A2 $\vdash$ 0338 $\cancel{\neq}$	22CA	$\rtimes$	RIGHT NORMAL FACTOR SEMIDIRECT PRODUCT
22AD	$\nVdash$	NOT TRUE ≡ 22A8 $\models$ 0338 $\cancel{\neq}$	22CB	$\times$	LEFT SEMIDIRECT PRODUCT
22AE	$\nVdash$	DOES NOT FORCE ≡ 22A9 $\Vdash$ 0338 $\cancel{\neq}$	22CC	$\succ$	RIGHT SEMIDIRECT PRODUCT → 2041 $\surd$ caret insertion point
22AF	$\nVdash$	NEGATED DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE ≡ 22AB $\equiv$ 0338 $\cancel{\neq}$	22CD	$\doteq$	REVERSED TILDE EQUALS
22B0	$\prec$	PRECEDES UNDER RELATION → 227A $<$ precedes	22CE	$\vee$	CURLY LOGICAL OR
22B1	$\succ$	SUCCEEDS UNDER RELATION → 227B $>$ succeeds	22CF	$\wedge$	CURLY LOGICAL AND
22B2	$\triangleleft$	NORMAL SUBGROUP OF → 25C5 $\triangleleft$ white left-pointing pointer	22D0	$\subseteq$	DOUBLE SUBSET
22B3	$\triangleleft$	CONTAINS AS NORMAL SUBGROUP → 25BB $\triangleright$ white right-pointing pointer	22D1	$\supseteq$	DOUBLE SUPERSET
22B4	$\trianglelefteq$	NORMAL SUBGROUP OF OR EQUAL TO	22D2	$\cap$	DOUBLE INTERSECTION
22B5	$\trianglerighteq$	CONTAINS AS NORMAL SUBGROUP OR EQUAL TO	22D3	$\cup$	DOUBLE UNION
22B6	$\leftrightarrow$	ORIGINAL OF	22D4	$\pitchfork$	PITCHFORK = proper intersection
22B7	$\leftrightarrow$	IMAGE OF	22D5	$\#$	EQUAL AND PARALLEL TO → 2317 $\#$ viewdata square
22B8	$\rightarrow$	MULTIMAP	22D6	$<$	LESS-THAN WITH DOT
22B9	$\dagger$	HERMITIAN CONJUGATE MATRIX	22D7	$>$	GREATER-THAN WITH DOT
22BA	$\intercal$	INTERCALATE	22D8	$\ll$	VERY MUCH LESS-THAN
22BB	$\underline{\vee}$	XOR	22D9	$\gg$	VERY MUCH GREATER-THAN
22BC	$\overline{\wedge}$	NAND → 2305 $\bar{\wedge}$ projective	22DA	$\equiv$	LESS-THAN EQUAL TO OR GREATER- THAN
22BD	$\nabla$	NOR	22DB	$\equiv$	GREATER-THAN EQUAL TO OR LESS- THAN
22BE	$\sphericalangle$	RIGHT ANGLE WITH ARC	22DC	$\doteq$	EQUAL TO OR LESS-THAN
22BF	$\triangle$	RIGHT TRIANGLE	22DD	$\doteq$	EQUAL TO OR GREATER-THAN
22C0	$\wedge$	N-ARY LOGICAL AND → 2227 $\wedge$ logical and	22DE	$\leq$	EQUAL TO OR PRECEDES
22C1	$\vee$	N-ARY LOGICAL OR → 2228 $\vee$ logical or	22DF	$\geq$	EQUAL TO OR SUCCEEDS
22C2	$\cap$	N-ARY INTERSECTION = z notation generalised intersection → 2229 $\cap$ intersection	22E0	$\nless$	DOES NOT PRECEDE OR EQUAL ≡ 227C $\leq$ 0338 $\cancel{\neq}$
22C3	$\cup$	N-ARY UNION = z notation generalised union → 222A $\cup$ union	22E1	$\nless$	DOES NOT SUCCEED OR EQUAL ≡ 227D $\geq$ 0338 $\cancel{\neq}$
22C4	$\diamond$	DIAMOND OPERATOR → 25C7 $\diamond$ white diamond	22E2	$\nless$	NOT SQUARE IMAGE OF OR EQUAL TO ≡ 2291 $\sqsubseteq$ 0338 $\cancel{\neq}$
22C5	$\cdot$	DOT OPERATOR → 00B7 $\cdot$ middle dot	22E3	$\nless$	NOT SQUARE ORIGINAL OF OR EQUAL TO ≡ 2292 $\sqsupseteq$ 0338 $\cancel{\neq}$
			22E4	$\sqsubseteq$	SQUARE IMAGE OF OR NOT EQUAL TO
			22E5	$\sqsupseteq$	SQUARE ORIGINAL OF OR NOT EQUAL TO
			22E6	$\approx$	LESS-THAN BUT NOT EQUIVALENT TO
			22E7	$\gtrsim$	GREATER-THAN BUT NOT EQUIVALENT TO
			22E8	$\preceq$	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 ⚭
22EE	:	VERTICAL ELLIPSIS • these four ellipses are used for matrix row/column elision → 2026 ... horizontal ellipsis
22EF	⋯	MIDLINE HORIZONTAL ELLIPSIS
22F0	⋱	UP RIGHT DIAGONAL ELLIPSIS
22F1	⋴	DOWN RIGHT DIAGONAL ELLIPSIS
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