# 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 5.1.*

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-5.1/ for charts showing only the characters added in Unicode 5.1.
See http://www.unicode.org/Public/5.1.0/charts/ for a complete archived file of character code charts for Unicode 5.1.

## Disclaimer

These charts are provided as the online reference to the character contents of the Unicode Standard, Version 5.1  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, #34, #38, #41, #42, and #44, 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.

## 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

|   | 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 ɕ 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 |
| 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 |
| 2213 | ∓ | MINUS-OR-PLUS SIGN |
| | | → 00B1 ± plus-minus sign |
| 2214 | ∔ | DOT PLUS |
| 2215 | ∕ | DIVISION SLASH |
| | | • generic division operator |
| | | → 002F / solidus |
| | | → 2044 ⁄ fraction slash |
| 2216 | ∖ | SET MINUS |
| | | → 005C \ reverse solidus |
| 2217 | ∗ | ASTERISK OPERATOR |
| | | → 002A * asterisk |
| 2218 | ∘ | RING OPERATOR |
| | | = composite function |
| | | = APL jot |
| | | → 00B0 ° degree sign |
| | | → 25E6 ◦ white bullet |
| 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 symbols

| | | |
|---|---|---|
| 221E | ∞ | INFINITY |
| 221F | ∟ | RIGHT ANGLE |
| 2220 | ∠ | ANGLE |
| 2221 | ∡ | MEASURED ANGLE |
| 2222 | ∢ | SPHERICAL ANGLE |
| | | = angle arc |

## Operators

| | | |
|---|---|---|
| 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 |

| 2228 | ∨ | LOGICAL OR |
|---|---|---|
| | | = vee, disjunction |
| | | → 22C1 ⋁ n-ary logical or |
| | | → 2304 ⌄ down arrowhead |
| 2229 | ∩ | INTERSECTION |
| | | = cap, hat |
| | | → 22C2 ⋂ n-ary intersection |
| 222A | ∪ | UNION |
| | | = cup |
| | | → 22C3 ⋃ n-ary union |

## 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 |
|---|---|---|
| 2235 | ∵ | BECAUSE |

## Relations

| 2236 | : | RATIO |
|---|---|---|
| | | → 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 |
| 223E | ∾ | INVERTED LAZY S |
| | | = most positive |

## Miscellaneous mathematical symbol

| 223F | ∿ | SINE WAVE |
|---|---|---|
| | | = alternating current |

## Operator

| 2240 | ≀ | WREATH PRODUCT |
|---|---|---|

## Relations

| 2241 | ≁ | NOT TILDE |
|---|---|---|
| | | ≡ 223C ∼ 0338 $\not$ |
| 2242 | ≂ | MINUS TILDE |
| 2243 | ≃ | ASYMPTOTICALLY EQUAL TO |
| 2244 | ≄ | NOT ASYMPTOTICALLY EQUAL TO |
| | | ≡ 2243 ≃ 0338 $\not$ |
| 2245 | ≅ | APPROXIMATELY EQUAL TO |
| 2246 | ≆ | APPROXIMATELY BUT NOT ACTUALLY EQUAL TO |
| 2247 | ≇ | NEITHER APPROXIMATELY NOR ACTUALLY EQUAL TO |
| | | ≡ 2245 ≅ 0338 $\not$ |
| 2248 | ≈ | ALMOST EQUAL TO |
| | | = asymptotic to |
| 2249 | ≉ | NOT ALMOST EQUAL TO |
| | | ≡ 2248 ≈ 0338 $\not$ |
| 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 |
| 2265 | ≥ | GREATER-THAN OR EQUAL TO |
| 2266 | ≦ | LESS-THAN OVER EQUAL TO |
| 2267 | ≧ | GREATER-THAN OVER EQUAL TO |
| 2268 | ≨ | LESS-THAN BUT NOT EQUAL TO |
| 2269 | ≩ | GREATER-THAN BUT NOT EQUAL TO |
| 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 |
| 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
→ 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 |
| 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 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 |

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   ⊨   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
      → 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
      → 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

## 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 |
| 22DB | ⋛ | GREATER-THAN EQUAL TO OR LESS-THAN |
| 22DC | ⋜ | EQUAL TO OR LESS-THAN |
| 22DD | ⋝ | EQUAL TO OR GREATER-THAN |
| 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 ◌̸ |
| 22EE | ⋮ | VERTICAL ELLIPSIS |
| | | • these four ellipses are used for matrix row/column elision |
| | | → 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 |
| 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 |