List of logic symbols

In logic, a set of symbols is commonly used to express logical representation. The following table lists many common symbols, together with their name, pronunciation, and the related field of mathematics. Additionally, the third column contains an informal definition, the fourth column gives a short example, the fifth and sixth give the Unicode location and name for use in HTML documents. The last column provides the LaTeX symbol.

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Basic logic symbols
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<th>Name</th>
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<td>⇒</td>
<td>material implication</td>
<td>implies; if ... then</td>
<td>propositional logic, Heyting algebra</td>
<td>A ⇒ B is true when A is true and B is false but true otherwise.</td>
<td>x = 2 ⇒ x^2 = 4 is true, but x^2 = 4 ⇒ x = 2 is in general false (since x could be -2).</td>
<td>U+21D2</td>
<td>⇒ &amp;Arr; ⇒ ⊃</td>
</tr>
<tr>
<td>⊃</td>
<td>material implication</td>
<td>implies; if ... then</td>
<td>propositional logic</td>
<td>A ⊃ B may mean the same as ⇒ (the symbol may also indicate the domain and codomain of a function; see table of mathematical symbols).</td>
<td>x + 5 = y + 2 ⊃ x + 3 = y</td>
<td>U+2192</td>
<td>&amp;U+2192 U+2283</td>
</tr>
<tr>
<td>⇔</td>
<td>material equivalence</td>
<td>if and only if; the same as</td>
<td>propositional logic</td>
<td>A ⇔ B is true only if both A and B are true, or both A and B are false.</td>
<td>x + 5 = y + 2 ⇔ x + 3 = y</td>
<td>U+21D4</td>
<td>&amp;U+21D4 U+2261 U+2194</td>
</tr>
<tr>
<td>¬</td>
<td>negation</td>
<td>not</td>
<td>propositional logic</td>
<td>The statement ¬A is true if and only if A is false.</td>
<td>¬(¬A) ⇔ A</td>
<td>U+00AC</td>
<td>&amp;U+00AC U+02DC U+0021</td>
</tr>
<tr>
<td>⊤</td>
<td>Domain of discourse</td>
<td>Domain of predicate</td>
<td>Predicate (mathematical logic)</td>
<td>The statement ⊤ is unconditionally true.</td>
<td>⊤(A) ⇒ A is always true.</td>
<td>U+1D53B</td>
<td>U+1D53B U+1D53B</td>
</tr>
<tr>
<td>∧</td>
<td>logical conjunction</td>
<td>and</td>
<td>propositional logic, Boolean algebra</td>
<td>The statement A ∧ B is true if A and B are both true; otherwise, it is false.</td>
<td>n &lt; 4 ∧ n &gt; 2 ⇔ n = 3 when n is a natural number.</td>
<td>U+2227</td>
<td>U+09AC U+09B7 U+0926</td>
</tr>
<tr>
<td>∨</td>
<td>logical (inclusive) disjunction</td>
<td>or</td>
<td>propositional logic, Boolean algebra</td>
<td>The statement A ∨ B is true if A or B (or both) are true; if both are false, the statement is false.</td>
<td>n ≥ 4 ∨ n ≤ 2 ⇔ n = 3 when n is a natural number.</td>
<td>U+2228</td>
<td>U+09BC U+092B U+2225</td>
</tr>
<tr>
<td>⊕</td>
<td>exclusive disjunction</td>
<td>xor; either ... or</td>
<td>propositional logic, Boolean algebra</td>
<td>The statement A ⊕ B is true when either A or B, but not both, are true. A ⊻ B means the same.</td>
<td>(¬A) ⊕ A is always true, and A ⊻ A is always false, if vacuous truth is excluded.</td>
<td>U+2295</td>
<td>U+22BB U+2262</td>
</tr>
<tr>
<td>⊢</td>
<td>Tautology</td>
<td>top, truth</td>
<td>propositional logic, Boolean algebra</td>
<td>The statement ⊢ is unconditionally true.</td>
<td>⊢(A) ⇒ A is always true.</td>
<td>U+22A4</td>
<td>U+22A4</td>
</tr>
<tr>
<td>⊥</td>
<td>Contradiction</td>
<td>bottom, falsum, falsity</td>
<td>propositional logic, Boolean algebra</td>
<td>The statement ⊥ is unconditionally false. (The symbol ⊥ may also refer to perpendicular lines.)</td>
<td>⊥(A) ⇒ A is always false.</td>
<td>U+22A5</td>
<td>U+22A5</td>
</tr>
<tr>
<td>∀</td>
<td>universal quantification</td>
<td>for all; for each</td>
<td>first-order logic</td>
<td>∀x: P(x) or (x) P(x) means ∀n ∈ ℕ : n^2 ≥ n.</td>
<td>∀n ∈ ℕ : n^2 ≥ n.</td>
<td>U+2200</td>
<td>U+2200</td>
</tr>
</tbody>
</table>

- **Symbol**: The mathematical symbol used in the expression.
- **Name**: The name of the symbol.
- **Read as**: How the symbol is read aloud.
- **Category**: The context in which the symbol is used.
- **Explanation**: A brief description of the symbol’s meaning or use.
- **Examples**: Specific examples of how the symbol is applied.
- **Unicode value (hexadecimal)**: The numeric value of the symbol in hexadecimal notation.
- **HTML value (decimal)**: The numeric value of the symbol in decimal notation.
These symbols are sorted by their Unicode value:

- U+00E5: COMBINING OVERLINE, used as abbreviation for standard numerals (Typographical Number Theory). For example, using HTML style "&Atilde;" is a shorthand for the standard numeral "SSSS0".
- U+00E8: Overline is also a rarely used format for denoting negation, still in use in electronics: for example, "¬G" says the Gödel number of "G". Overline is also an outdated way for denoting negation, still in use in electronics: for example, "¬(A ∨ B)" is the same as "¬(A <\lor> B)".
- U+00E9: Webb-operator or Peirce arrow, the sign for the NOR operator (negation of disjunction).[4]
- U+00F6: Circled dot operator, the sign for the XNOR operator (negation of exclusive disjunction).
- U+2000: Complement
- U+2004: THERE DOES NOT EXIST: strike out existential quantifier, same as "¬∃"[4]
- U+2034: THEREFORE: Therefore[4]
- U+22A7: MODELS: is a model of (or "is a valuation satisfying")[3]
- U+22A8: IFF: true: is true of
- U+22AC: DOES NOT PROVE: negated ⊬, the sign for "does not prove", for example T ⊬ P says "P is not a theorem of T"[4]
- U+22AD: NOT TRUE: is not true of
- U+2269: DAGGER: Affirmation operator (read "It is true that..."
- U+228C: NAND: NAND operator.
- U+22BD: NOR: NOR operator.
- U+22C7: WHITE DIAMOND: modal operator for "it is possible that", "it is not necessarily not" or rarely "it is not provable not" (in most modal logics it is defined as "¬¬")[4]
- U+22C6: STAR OPERATOR: usually used for ad-hoc operators
- U+22A5: UP TACK: or U+2193: DOWNSWEEP ARROW: Webb-operator or Peirce arrow, the sign for NOR. Confusingly, "⊥" is also the sign for contradiction or absurdity.[4]
- U+231F: REVERSED NOT SIGN
- U+231C: TOP LEFT CORNER and U+231D: TOP RIGHT CORNER: corner quotes, also called "Quine quotes": for quasi-quotations, i.e. quoting specific context of unspecified ("variable") expressions[5] also used for denoting Gödel number;[3] for example ""31"" denotes the Gödel number of G. (Typographical note: although the quotes appear as a "pair" in unicode (231C and 231D), they are not symmetrical in some fonts. And in some fonts (for example Arial) they are only symmetrical in certain sizes. Alternatively the quotes can be rendered as [ and ] (U+2308 and U+2309) or by using a negation symbol and a reversed negation symbol ¬¬ in superscript mode.)
Usage in various countries

Poland and Germany

As of 2014 in Poland, the universal quantifier is sometimes written $\forall$, and the existential quantifier as $\exists$. The same applies for Germany.\(^{[7][8][9][10]}\)

Japan

The $\Rightarrow$ symbol is often used in text to mean "result" or "conclusion", as in "We examined whether to sell the product $\Rightarrow$ We will not sell it". Also, the $\rightarrow$ symbol is often used to denote "changed to", as in the sentence "The interest rate changed. March 20% → April 21%".

See also

- Józef Maria Bocheński
- List of notation used in Principia Mathematica
- List of mathematical symbols
- Logic alphabet, a suggested set of logical symbols
- Logic gate § Symbols
- Logical connective
- Mathematical operators and symbols in Unicode
- Non-logical symbol
- Polish notation
- Truth function
- Truth table
- Wikipedia:WikiProject Logic/Standards for notation

References

3. Although this character is available in LaTeX, the MediaWiki TeX system does not support it.

Further reading


External links