

Overline

An **overline**, **overscore**, or **overbar**, is a typographical feature of a horizontal line drawn immediately above the text. In mathematical notation, an overline has been used for a long time and is known as *vinculum*. Other uses are to indicate Roman numerals multiplied by a thousand and in forming medieval abbreviations (sigla). Marking one or more words with a continuous line above the characters is sometimes called *overstriking*, though overstriking generally refers to printing one character on top of an already-printed character.

An overline, that is, a single line above a chunk of text, should not be confused with the macron, a diacritical mark placed above (or sometimes below) *individual* letters. The macron is narrower than the character box.^[1] Since ISO and Unicode Consortium assign names to characters in their unique fashion and often ignore the established typographical terminology, Unicode includes two characters U+00AF – macron (formerly spacing macron) and U+203E – overline that *both* look like an overlined space in most fonts, similar to a mirrored underscore symbol. An overline proper can be encoded as a Unicode diacritic; see below.

1 Uses

1.1 Math and science

In mathematics, an overline is also referred to as a *vinculum*.

The vinculum can indicate a line segment:

- \overline{AB}

The vinculum can indicate a repeating decimal value:

- $\frac{1}{7} = 0.142857 = 0.142857\overline{142857}142857142857\dots$

When it is not possible to format the number so that the overline is over the digit(s) that repeat, one overline character is placed to the left of the digit(s) that repeat:

- $3.\overline{3} = 3.3 = 3.333333333333\dots$
- $3.\overline{12}34 = 3.123434343434\dots$

The overline is also used to indicate a sample mean:

- \bar{x} is the average value of x_i

In set theory and some electrical engineering contexts, negation operators can be written as an overline above the term or expression to be negated, for example:

Common set theory notation:

$$\overline{A \cup B} \equiv \overline{A} \cap \overline{B}$$

$$\overline{A \cap B} \equiv \overline{A} \cup \overline{B}$$

Electrical engineering notation:

$$\overline{A \cdot B} \equiv \overline{A} + \overline{B}$$

$$\overline{A + B} \equiv \overline{A} \cdot \overline{B}$$

in which implied multiplication, the times (cross) and the dot all mean logical AND, and the plus sign means logical OR.

Both illustrate De Morgan's laws and its mnemonic, "break the line, change the sign".

The overline notation can indicate a complex conjugate and analogous operations.

- if $x = a + ib$, then $\bar{x} = a - ib$.

In physics, an overline sometimes indicates a vector, although boldface and arrows are also commonly used:

- $\bar{x} = |x|\hat{x}$

In crystallography, an overline indicates an improper rotation or a negative number:

- $\bar{3}$ is the Hermann–Mauguin notation for a threefold rotoinversion.
- $[\overline{1}\overline{1}\overline{2}]$ is the direction with Miller indices $h = -1$, $k = 1$, $l = -2$.

1.2 Writing

An overline-like symbol is traditionally used in Syriac text to mark abbreviations and numbers. It has dots at each end and the center.

1.3 Linguistics

X-bar theory makes use of overbar notation to indicate differing levels of syntactic structure. Certain structures are represented by adding an overbar to the unit, as in X . Due to difficulty in typesetting the overbar, the prime symbol is often used instead, as in X' . Contemporary typesetting software, such as LaTeX, has made typesetting overbars considerably simpler; both prime and overbar markers are accepted usages. Some variants of X-bar notation use a double-bar (or double-prime) to represent phrasal-level units.

X-bar theory derives its name from the overbar. One of the core proposals of the theory was the creation of an intermediate syntactic node between phrasal (XP) and unit (X) levels; rather than introduce a different label, the intermediate unit was marked with a bar.

2 Implementations

2.1 HTML with CSS

In HTML using CSS, the overline is implemented via `text-decoration` property: `text`, results in: text. It supports also other typographical features with horizontal lines: `underline` (a line below the text) and `strikethrough` (a line through the text).

2.2 Unicode

As mentioned above, Unicode includes two graphic characters, U+00AF ¯ macron and U+203E ¯ overline. They are compatibility equivalent to the U+0020 space with non-spacing diacritics U+0304 ◌ combining macron and U+0305 ◌ combining overline respectively; the latter allows an overline to be placed over any character. As with any combining character, it appears in the same character box as the character that logically precedes it: for example, \bar{x} , compared to $x\bar{}$. A series of overlined characters usually results in an unbroken line, depending on the font (for example, T23).

For East Asian (CJK) computing, U+FFE3 ¯ fullwidth macron is available. Despite the name, Unicode maps this character to both U+203E and U+00AF.^[2]

Unicode maps the overline-like character from ISO/IEC 8859-1 and code page 850 to the U+00AF ¯ macron symbol mentioned above. In a reversal of its official name (and compatibility decomposition), it is much wider than an actual macron diacritic over most letters, and actually wider than U+203E ¯ overline in most fonts. In Microsoft Windows, U+00AF can be entered with the keystrokes Alt+0175 (where numbers are entered from the numeric keypad). In GTK/GTK+, the symbol can be added using

the keystrokes Ctrl+↑ Shift+U to activate Unicode input, then type “00AF” as the code for the character.

The Unicode character U+070F syriac abbreviation mark is used to mark Syriac abbreviations and numbers. However, most computer systems do not render this line correctly or at all.

2.3 Word processors

In Microsoft Word, overstriking of text can be accomplished with the EQ \O() field code. The field code {EQ \O(x, ¯)} produces x and the field code {EQ \O(xyz, ¯)} produces xyz .

LibreOffice has direct support for several styles of overline in its “Format / Character / Font Effects” dialog.

Overstriking of longer sections of text, such as in 123, can also be produced in many text processors as text markup as a special form of understriking.

2.4 TeX

In LaTeX, a text `<text>` can be overlined with `\overline{\mbox{<text>}}$`. The inner `\mbox{}` is necessary to override the math-mode (here invoked by the dollar signs) which the `\overline{}` demands.

3 References

- [1] Wells, J.C. (2001). “Orthographic diacritics and multilingual computing”. University College London. Retrieved 23 March 2014.
- [2] The Unicode Consortium (2012), “Halfwidth and Fullwidth Forms”, *The Unicode Standard 6.1*, ISBN 978-1-936213-02-3, “FULLWIDTH MACRON • sometimes treated as fullwidth overline”

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