

# LaTeX Style Guide for the *Journal of Integer Sequences* Version 1.57

Authors of papers in the *Journal of Integer Sequences* should write their papers in English. **If English is not your native language, please ask a native-speaking colleague or local native speaker to help proofread your paper.** This will greatly improve your chances for acceptance. Probably you can find a native speaker at your university. If not, you might try contacting your local US, Canadian, or British Embassy.

If you have no local access to a native speaker, you can (for a fee) have people read and edit your paper online. For example, visit <http://webshop.elsevier.com/languageservices/languageediting/> or <http://www.edanzediting.com/>.

Authors of papers in the *Journal of Integer Sequences* should prepare their papers in LaTeX. We do *not* recommend use of add-on packages such as Scientific Workplace. Please observe the following guidelines.

The guidelines most frequently violated appear in **red**. Please pay special attention to these.

## 1 LaTeX advice

Prepare your paper using the “12pt” option of latex, since this is what we will use when we publish your paper. Do not use “11pt” or “10pt”, as this can cause problems formatting large equations when we switch to “12pt”.

Please avoid the use of special-purpose macros whenever possible. **Strip your paper of references to all packages and definitions that you do not actually use.** (Do *not* just comment them out.) **Remove all commented-out lines (those with the symbol %).**

**It is probably worthwhile to download the latex file for a paper recently published in the journal and model your paper on it.** (However, do not use the latex file for the instructions you are now reading as a model.)

Do *not* include a date in the title page of your paper.

Use the default (Computer Modern) font. Do not use Times Roman or other fonts.

**Acknowledgments should be in a *separate, numbered section* at the end of the paper.**

Avoid the use of `PicTeX`; it uses too many registers and is often not compatible with packages we use to publish your paper. If you absolutely have to use it, consider the use of `pictexwd` instead.

Please do not use `tcilatex` or the `amsart` article style when you prepare your article.

## 2 Common grammatical errors

Please **be sure to run your paper through a spell-checker before submission!** Our Journal uses American spellings, so write “recognize” (not “recognise”); “generalize” (not “generalise”); “color” (not “colour”), etc.

1. Avoid the passive voice. Instead of saying “In [1] it is shown that all primes  $> 2$  are odd”, say “Smith [1] showed that all primes  $> 2$  are odd”.
2. Avoid use of weak constructions such as “this number” or “it”. For example, instead of saying  
Wrong: Let  $x$  be a prime. We now square this number.  
Right: Let  $x$  be a prime. We now square  $x$ .
3. Avoid the use of contractions, such as “don’t”, “can’t”, “isn’t”, etc.  
Wrong: The number 7 is prime, since it isn’t divisible by 2, 3, 4, 5, or 6.  
Right: The number 7 is prime, since it is not divisible by 2, 3, 4, 5, or 6.
4. The word “precise” is not a verb in English.  
Wrong: We now precise the connection between  $\alpha$  and  $\beta$ .  
Right: We now make the connection between  $\alpha$  and  $\beta$  more precise.
5. Use the word “expansion”, not “development”.  
Wrong: Let  $[a_0, a_1, \dots]$  be the continued fraction development of  $x$ .  
Right: Let  $[a_0, a_1, \dots]$  be the continued fraction expansion of  $x$ .
6. Use “associate with”, not “associate to”.  
Wrong: We now associate  $x$  to  $y$ .  
Right: We now associate  $x$  with  $y$ .
7. Use “root” for equations, and “zero” for polynomials.  
Wrong: Let  $\alpha$  be the positive root of  $x^2 - x - 1$ .  
Right: Let  $\alpha$  be the positive zero of  $x^2 - x - 1$ .  
Right: Let  $\alpha$  be the positive root of  $x^2 - x - 1 = 0$ .

8. Use the term “pair”, not “couple”, to denote two objects.  
 Wrong: Let  $(\alpha, \beta)$  be a couple of real numbers.  
 Right: Let  $(\alpha, \beta)$  be a pair of real numbers.
9. Use the construction “We let  $x$  denote  $y$ ” and not “Denote by  $x$   $y$ ”.  
 Wrong: Denote by  $\mathbb{N}$  the set of positive integers.  
 Right: We let  $\mathbb{N}$  denote the set of positive integers.
10. **Avoid run-on sentences.** A run-on sentence is one that expresses two thoughts in a single phrase. Fix by separating into two or more sentences, or by connecting with a semi-colon or a conjunction such as “and”. More information can be found in the Wikipedia article on run-on sentences.  
 Wrong: Let  $\Sigma$  be a finite alphabet,  $\Sigma^*$  denote the set of all finite words over  $\Sigma$ .  
 Right: Let  $\Sigma$  be a finite alphabet, and let  $\Sigma^*$  denote the set of all finite words over  $\Sigma$ .  
 Wrong: Let  $p$  be a prime number  $\geq 3$ , then  $2^p \equiv 2 \pmod{p}$ .  
 Right: Let  $p$  be a prime number  $\geq 3$ . Then  $2^p \equiv 2 \pmod{p}$ .
11. Avoid starting sentences or phrases with notation.  
 Wrong:  $f$  maps integers to real numbers.  
 Right: The function  $f$  maps integers to real numbers.
12. Avoid treating citation numbers as objects of prepositions. Treat them syntactically like footnotes.  
 Wrong: In [1] it is proved that  $e$  is irrational.  
 Wrong: The article [1] proves that  $e$  is irrational.  
 Right: Euler [1] proved that  $e$  is irrational.
13. Words like “notation”, “work”, and “information” are mass nouns in English, and as such, rarely appear in the plural.  
 Wrong: We now introduce some definitions and notations.  
 Right: We now introduce some definitions and notation.  
  
 Wrong: You can find many works on continued fractions in the literature.  
 Right: You can find many papers on continued fractions in the literature.  
 The Wikipedia article on mass nouns contains more information.

### 3 Common punctuation errors

- Use colons properly. **In general, colons should not immediately follow verbs.**

Wrong: The resulting equation is:

$$x = y^2.$$

Right: The resulting equation is

$$x = y^2.$$

Right: The resulting equation is as follows:

$$x = y^2.$$

- **Always put a comma after “i.e.” and “e.g.” and “resp.”.** Do *not* put these abbreviations in the italic font.

Wrong: Let  $x$  be a minimal element i.e. an element such that if  $y \leq x$  then  $y = x$ .

Wrong: Let  $x$  be a prime e.g. 2.

Right: Let  $x$  be a minimal element, i.e., an element such that if  $y \leq x$  then  $y = x$ .

Right: Let  $x$  be a prime, e.g., 2.

- Don't be stingy with commas. Commas should set off parenthetical phrases such as “for example”, “in particular”, and so forth.

Wrong: Then  $x$ , for example is a real number.

Right: Then  $x$ , for example, is a real number.

- Avoid excessive and inappropriate capitalization.

Wrong: We let  $H(x)$  denote the Hankel Transform of  $x$ .

Right: We let  $H(x)$  denote the Hankel transform of  $x$ .

Wrong: Tamigawa's Theorem states that  $e^x = y$ .

Right: Tamigawa's theorem states that  $e^x = y$ .

Wrong: Now we use the Cayley-Hamilton Theorem.

Right: Now we use the Cayley-Hamilton theorem.

Wrong: The result follows by the Prime Number Theorem.

Right: The result follows by the prime number theorem.

Wrong: The Fibonacci Numbers are numbers satisfying the recurrence...

Right: The Fibonacci numbers are numbers satisfying the recurrence...

Wrong: We use the Euclidean Algorithm to compute  $\text{gcd}(m, n)$ .

Right: We use the Euclidean algorithm to compute  $\text{gcd}(m, n)$ .

Wrong: This is an entry in Pascal’s Triangle.

Right: This is an entry in Pascal’s triangle.

- Lists of three or more things always need the “Oxford comma”.

Wrong: Smith, Jones and Wu solved the problem.

Right: Smith, Jones, and Wu solved the problem.

## 4 Common LaTeX errors

This section lists a few of the common errors made when preparing papers in LaTeX.

### 4.1 Blackboard bold

For blackboard bold symbols such as  $\mathbb{Z}$ ,  $\mathbb{Q}$ ,  $\mathbb{R}$ ,  $\mathbb{C}$ , use `\mathbb{Z}`, for example. You may need to include the command `\usepackage{amssymb}`.

### 4.2 Variables and expressions

**All mathematics must appear in mathematics mode.**

Almost always, variables such as  $x$ ,  $y$ ,  $n$ , etc., should appear in the italic font. This will occur automatically if you remember to enclose your equations (even references to a single variable) in dollar signs or double-dollar signs, or use a latex equation environment.

Wrong: Let  $n$  be the number of integers in the list.

Right: Let  $\$n\$$  be the number of integers in the list.

If a variable or expression ends a sentence or phrase, do *not* include the punctuation inside the  $\$$ ; doing so messes up the spacing.

Right: And so the number of terms is  $\$n\$$ .

Wrong: And so the number of terms is  $\$n.\$$

### 4.3 Spacing

Please try not to include any commands that tweak the spacing (such as `\`, `\noindent`, `\newpage`, `\bigskip`, `\pagebreak`, `\linebreak`, etc.) since when your paper is formatted for final publication, the page breaks and spacing will probably be quite different from what you currently see. The proper way to separate paragraphs is with a single blank line, and *not* with `\` at the end of the line.

**Don’t forget that if a period follows a lower-case letter and does not end a sentence, then you must escape the period by putting a `\` and then a space immediately after it.** For example:

Right: We use a flern (cf. \ the previous theorem) in the proof.  
Wrong: We use a flern (cf. the previous theorem) in the proof.

## 4.4 Accents

Be careful to use the proper accents. The name Erdős, for example, uses a Hungarian accent, and should be formatted with `\H`. The name Sierpiński needs an accent on the “n”. Create accents using the standard LaTeX abbreviations; do *not* use special non-ASCII (UNICODE) characters, keyboard shortcuts, or other exotic character sets to make them. Warning: cutting and pasting from web pages often results in non-ASCII (UNICODE) characters being inserted into your file, so avoid this practice. Also, never use math mode to create your accents.

Some examples:

`T\'oth` gives Tóth

`mis\`ere` gives misère

`Schr\`oder` gives Schröder

`N{\o}rg{\aa}rd` gives Nørgård

## 4.5 Floor and ceiling

Be sure to use the built-in TeX commands `\lfloor`, `\rfloor` and `\lceil`, `\rceil`, not square brackets, when using these integer functions.

## 4.6 Min and max

Be sure to use the built-in TeX commands `\min` and `\max` when using these functions.

## 4.7 Gcd and lcm

Be sure to use the built-in TeX command `\gcd` for greatest common divisor. Don't write  $(a, b)$  for the gcd of  $a$  and  $b$ ; write  $\gcd(a, b)$  instead. For lcm, you will have to define your own command so that it appears in the roman font. The best way to do this is to use the command

```
\DeclareMathOperator{\lcm}{lcm}
```

Do *not* use square brackets for lcm!

## 4.8 Binomial coefficients

Use `\choose` for binomial coefficients. Do not use the latex array environment.

## 4.9 Multi-letter functions

As a general rule, all multi-letter functions such as `sin`, `cos`, `tan`, etc., should appear in the roman font. For these functions you can use the built-in  $\TeX$  commands `\sin`, `\cos`, `\tan`, etc., but for others (e.g., `Li` for the logarithmic integral) you may have to define your own commands. Again, the best way to do this is, e.g.,

```
\DeclareMathOperator{\Li}{Li}
```

## 4.10 Parentheses

Use parentheses for grouping, not square brackets or braces. You can get different sizes of parentheses using, for example, `\bigl(` and `\bigr)`.

## 4.11 Mod

Observe the distinction between the use of “mod” as a function of two arguments, mapping  $a \bmod b$  to the least non-negative residue of  $a$  modulo  $b$ , and “mod” as an equivalence relation. For the first, use the  $\TeX$  command `\bmod`. For the second, use the  $\TeX$  command `\pmod` for displayed equations *only*; for in-line equations and subscripts write something like

$$x \equiv a \pmod{b},$$

which typesets as follows:  $x \equiv a \pmod{b}$ . Do not use notation like  $x \equiv y [p]$ .

You can also define the following macro:

```
\def\modd#1 #2{\#1\ \mbox{\rm (mod)}\ #2\mbox{\rm )}}
```

which then can be used as follows:

$$x \equiv \modd{a}{b}.$$

The general rule to observe is that “mod” should *never* appear in the italic font, even in theorem statements.

## 4.12 Quote marks

Do not enclose words in ordinary quotation marks "like this". This results in the following ugly output:

”like this”

Instead, use the left-quote and right-quote symbols, ‘ ‘like this’ ’, which gives the correct

“like this” .

## 4.13 Sequences

Use parentheses, not braces, to denote sequences. For example,  $(F_n)_{n \geq 0}$  is the correct way to write the Fibonacci sequence.

## 4.14 Proper use of `\ldots` and `\cdots`

**Be sure to use `\ldots` and `\cdots` properly.** The general rule is as follows: you should use `\ldots` if the center of mass of the items on either side is below the middle of the line — for example, if the items on either side are commas. You should use `\cdots` if the center of mass of the items on either side is in the middle of the line — for example, if the items on either side are alphabet symbols. For example:

Wrong: Consider the product  $a_1 a_2 \dots a_n$ . (Here we used `\ldots`.)

Right: Consider the product  $a_1 a_2 \cdots a_n$ . (Here we used `\cdots`.)

Wrong: Consider the sequence  $a_1, a_2, \dots, a_n$ . (Here we used `\cdots`.)

Right: Consider the sequence  $a_1, a_2, \dots, a_n$ . (Here we used `\ldots`.)

**Under *no* circumstances should you ever write “...”.** Use the appropriate dots command instead.

## 4.15 Proper punctuation of case statements

Please punctuate case statements as follows:

$$f(x) = \begin{cases} 1, & \text{if } x \text{ is irrational;} \\ 0, & \text{otherwise.} \end{cases}$$

**Do *not* use the `array` environment to do case statements.** Use `\begin{cases}...`  
`\end{cases}`. Within a case statement, use `\text{...}`, not `\mathrm{...}`.

So the above would be written:

```
\begin{displaymath}
f(x) = \begin{cases}
  1, & \text{\text{if } $x$ is irrational;}}\
  0, & \text{\text{otherwise.}}
\end{cases}
\end{displaymath}
```

## 4.16 Words in set notation

When using set notation, any English words *must* appear in the Roman font. The easiest way to use this is to use the `\text` command.

## 4.17 Inequalities

Please use `\geq`, not `\geqslant`. Similarly, please use `\leq`, not `\leqslant`.



## 5 Title page

The title page should include the title of your article (capitalized), and the complete address and affiliations, including academic department, e-mail address, and country, for all authors. (By “capitalized” we do not mean you should capitalize every letter of every word; just the first letter of all nontrivial words.) Write your name with the surname *last*; if it is unclear which is your first name and which is your surname, please indicate this in a comment.

Do not put footnotes to the title. Sponsoring information can be placed in a footnote attached to the individual author’s name.

Lines of your address should not end in commas.

## 6 Sections

Break your paper up into logical sections. Section titles should *not* be capitalized.

## 7 Definitions

Terms that are being defined should be in a special font, such as italic or slant.

For example,

A *fjern* is a 3-dimensional hypersquare.

Avoid introducing new terms and notation when there are already accepted equivalents widely in use in the mathematical community. For example, for the Fibonacci numbers, you should use the notation  $F_n$ , and the numbers defined by  $F_0 = 0$ ,  $F_1 = 1$ ,  $F_n = F_{n-1} + F_{n-2}$  for  $n \geq 2$ .

## 8 People

When referring to people, **use their last name only**, unless additional information is required to disambiguate. If you *do* include initials, make sure there is a space between each initial and between the initials and the name.

Right: Euler proved that  $e$  is irrational.

Wrong: L. Euler proved that  $e$  is irrational.

Right: J. R. Smith

Wrong: J.R. Smith

Wrong: J R Smith

Wrong: John R Smith

## 9 Theorems

Use the `\begin{theorem} ...` and `\end{theorem}` environments for theorems, lemmas, propositions, remarks, etc. Theorems should be numbered. Refer to theorems, lemmas, propositions, remarks, sections, equations, figures, tables, etc. using labels; *do not hard-code references to them*. When you refer to theorems, definitions, propositions, and so forth, be sure to capitalize the word Theorem (resp., Definition, Proposition, etc.) if it is attached to a reference label (number), and not otherwise.

Do not put any space characters or special characters, such as minus signs, in labels!

Right: We now use Theorem 4.

Wrong: We now use theorem 4.

Right: We now use a previous theorem.

Wrong: We now use a previous Theorem.

To get proper definitions, use the `\usepackage{amsthm}` command.

Do not redefine equation numbers or appearance.

Here is the code we use for declaring theorem environments:

```
\theoremstyle{plain}
\newtheorem{theorem}{Theorem}
\newtheorem{corollary}[theorem]{Corollary}
\newtheorem{lemma}[theorem]{Lemma}
\newtheorem{proposition}[theorem]{Proposition}
```

```
\theoremstyle{definition}
\newtheorem{definition}[theorem]{Definition}
\newtheorem{example}[theorem]{Example}
\newtheorem{conjecture}[theorem]{Conjecture}
```

```
\theoremstyle{remark}
\newtheorem{remark}[theorem]{Remark}
```

You can just cut and paste this into your file, right after the begin document command.

## 10 Equations

Not all equations need to be numbered. If you number an equation, use a label and then refer to the label using `\eqref{eq1}` or Eq.~(`\ref{eq1}`) something similar. Do not use things like (\*), with a star or asterisk, to number equations.

## 11 Definitions, examples, and remarks

All definitions, examples, and remarks should be stated in the roman font, except (of course) for any mathematical symbols. You can use the following code as an example.

```
\theoremstyle{definition}
\newtheorem{defn}{Definition}
```

## 12 Proofs

Use the commands `\begin{proof}` and `\end{proof}` to delimit proofs. These are available in the `amsthm` package mentioned above. Do not change the appearance of the proof environment.

## 13 Tables and Figures

Tables and Figures should be **centered** on the page, using the `center` environment. Each table and each should have a number. Captions should appear *underneath* the table or figure. Use `rescalebox`, if necessary, to make sure your paper fits properly on the page.

Note that the position of tables and figures could change as your paper is reformatted for final publication. If the positioning is crucial, then please use the `float` latex package in your preamble, and use the `H` option to force the table/figure to appear in the place you need it.

## 14 Introduction

Papers should have an introductory section that provides motivation and history of the problems discussed. This is the place to put your results in context, and summarize your main contributions.

## 15 Abstract

Every paper should have a short abstract of 50 to 200 words. When referring to your own results, use the present tense. **The abstract should be free of symbols and equations to the extent it is possible. Avoid the passive voice in abstracts, wherever reasonable.**

The abstract should be an independent entity and should stand on its own. For example, it *should not* contain citations to the bibliography, or references to the numbers of equations, theorems, or sections of the paper. It should not contain numbered equations itself.

When referring to other work in the abstract, you can refer to author's names, but avoid mentioning years, journal names, or other information.

## 16 Sequence numbers

Be sure to include sequence numbers from Sloane’s online *Encyclopedia of Integer Sequences* for all sequences you discuss in your paper. The list of all such sequences should be summarized at the end of your paper, sorted in ascending order. If the sequences do not exist in the *Encyclopedia*, please submit them to [www.oeis.org](http://www.oeis.org) and record the A-numbers assigned, and add those to your paper.

When you refer to a sequence inside your paper, use the “seqnum” macro:

```
\newcommand{\seqnum}[1]{\href{http://oeis.org/#1}{\underline{#1}}}
```

## 17 Citations

**Use citations syntactically like footnotes, not as objects of prepositions.** Avoid saying things like “In [1] we find the following result.” Instead, say “Jones [1] proved the following result.” Use the LaTeX command `\cite`; do *not* hard-code references to the bibliography.

Avoiding enclosing citations in an extra pair of parentheses. In other words, citations should appear like “[13]” and not “([13])” or “(see [13])”.

If you cite a paper with many authors inside the text, you can use “et al.”, but do not put it in italics and use the first author’s name. (However, be sure to give the complete author list in the bibliography.)

In the bibliography, if the author has two initials, be sure to place a space between the two initials.

Wrong: N.J.A. Sloane

Right: N. J. A. Sloane

Two authors should be separated with “and”:

Wrong: J. Smith, D. Jones

Right: J. Smith and D. Jones

Three or more authors should be separated with the “Oxford comma”.

Right: J. Smith, D. Jones, and Z. Xu

Wrong: J. Smith, D. Jones and Z. Xu

When simultaneously citing multiple references, use syntax similar to `\cite{ref1,ref2,ref3}` to combine all references in a single pair of brackets; do *not* write `\cite{ref1}`, `\cite{ref2}`, `\cite{ref3}`.

When citing a theorem or page number in another work, say `\cite[p.\ 123]{ref1}` or something similar. Note in particular the backslash and space after the dot. This is needed because LaTeX assumes that a dot following a lowercase letter indicates the end of a sentence, and hence inserts extra space.

Please use the following examples when preparing citations. Pay careful attention to punctuation and the use of roman, italic, and bold fonts. In particular, notice that page ranges should be separated by two hyphens in LaTeX: write 123--145, not 123-145.

Please use the standard *Mathematical Reviews* abbreviations for journal names, with the exception that for particularly obscure journals you may provide the entire name.

The *Mathematical Reviews* journal abbreviation list can be found here:

<http://www.ams.org/msnhtml/serials.pdf>

Do not include citations to reviews of the articles, such as those appearing in *Zentralblatt* or *Math. Reviews*.

Avoid references to secondary sources, such as Wikipedia, unless there is really no alternative.

Always give a complete author list in the bibliography. Be sure that any mathematics in bibliography items appears in mathematics mode, like in the main text.

## 17.1 Article citation

1. J. Chan and F. E. Smith, An article about Chan-Smith numbers, *J. of Chan-Smith Numbers* **13** (1998), 123–124.

Provide the volume, but **not** the issue number, unless the issue number is required to uniquely specify the paper. Note that words in article titles should *not* be capitalized, with the following exceptions: the first word, proper nouns, and German nouns. The journal name should be in italics; the volume number should be in bold. Do not use “pp.” to provide page numbers for articles. Use -- for page ranges.

## 17.2 Book citation

2. A. Alces, *Introduction to Moose Theory*, Springer, 1995.

Book titles should be in italics. Note that words in book titles should be capitalized, with the exception of very short unimportant words, such as “to”, “of”, “and”, etc. Do not include the ISBN number. It is not necessary to give the place of publication unless it is a very rare or hard-to-find book.

If you cite a particular theorem or page or section inside a book, then use the bibliography to list the book information *only*. When you cite it, however, you should use syntax like `\cite[Thm.\ 2.3, p.\ 45]{Alces}` to get something like [17, Thm. 2.3, p. 45]. Avoid citing a book without specifying the exact result you are using.

## 17.3 Article in conference proceedings or book

3. B. Franklin, The public library as an aid to research, in G. Washington and T. Jefferson, eds., *Public Libraries in the United States*, Addison-Wesley, 2001, pp. 16–32.
4. P. Flajolet, How to count, in *Automata, Languages, and Programming: Proc. ICALP 1990*, Lect. Notes in Comp. Sci., Vol. 443, Springer, 1991, pp. 220–234.

Capitalize the name of the book, but *not* the paper you are referring to in the book. Note that here, unlike the case of a journal article, the abbreviation “pp.” is used.

## 17.4 Unpublished material or material on the web

5. B. Obama, G. Bush, and W. J. Clinton, Combinatorial reasoning in American elections, preprint, 2005, <http://www.barackobama.com/combin.pdf>.

6. J. Schmoie, Pattern avoidance, preprint, 2005, <http://arxiv.org/abs/1111.2222>.

You should use the command `\url` to specify the URL of electronic manuscripts. (This command is available in the `hyperref` package.) Do *not* use syntax like `arXiv:1357.2468`.

Note that the correct URL for the Online Encyclopedia of Integer Sequences is <http://oeis.org>.

## 18 Other issues

All sections of your paper should be numbered. Do *not* hard-code references to section numbers; give each section a label and refer to it.

Please be sure that your paper contains a list of *key words and phrases* and the appropriate *AMS 2010 Mathematics Subject Classifications*. The key words should be in the singular (e.g., write “Fibonacci number” and not “Fibonacci numbers”), should be separated by commas, and should not be capitalized. A list of all the subject classifications can be found at

<http://www.ams.org/msnhtml/classification.pdf>.

**Provide only one classification as primary** and any additional ones as secondary.

Avoid starting a line of your file with the word “From”. Many mailers insert a `>` character in such lines, causing a question mark to appear in your text. If you must start a line of the file with the word “From”, you can insert a space first.

**Do not include any non-ASCII (UNICODE) special characters in your file.** These can arise, for example, from cutting and pasting references from the web. Check to make sure, for example, that dashes are represented by `--` or `---` and not special UNICODE characters.