LONGDIVISION

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The LONGDIVISION package defines two main commands: `\longdivision` and `\intlongdivision`. The usage for both is `\longdivision[⟨options⟩]{⟨dividend⟩}{⟨divisor⟩}`. The difference is that `\longdivision` divides until the remainders repeat or the quotient has too many digits to fit the page, whereas `\intlongdivision` does integer division and leaves the remainder. The command `\longdivisionkeys{⟨options⟩}` is also defined to set default options. At most 20 division steps worth of work will be displayed and at most 60 digits worth of division output will be produced. Thanks to Mike Jenck, Cameron McLeman, and Yu-Tsung Tai for emailing me with bug reports and feature requests.

Here is an example usage:

```
\longdivision{100}{22}
\quad
\intlongdivision{100}{22}
```

```
       4.5̅4̅                4
22 ) 100.00         22 ) 100
      88                  88
      12.0                12
      11.0
       1.00
         88
         12
```

These commands have several key-value options:

`max extra digits` = ⟨*nonnegative integer*⟩

This key determines the maximum amount of “extra” zeroes to add to the end of the dividend in the process of division – if the quotient has more digits before it repeats, the division will just stop. This is only an option for `\longdivision`, the command `\intlongdivision{⟨dividend⟩}{⟨divisor⟩}` is equivalent to `\longdivision[max extra digits=0]{⟨dividend⟩}{⟨divisor⟩}`. For brevity, this option has the short form where just the value is provided: `\longdivision[2]{⟨dividend⟩}{⟨divisor⟩}` is the same as `\longdivision[max extra digits=2]{⟨dividend⟩}{⟨divisor⟩}`.

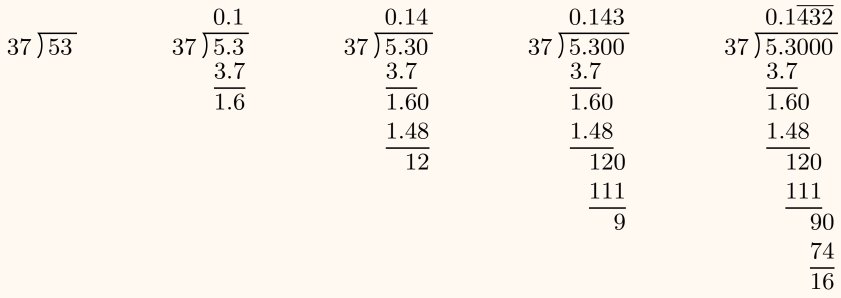
```
\longdivision[max extra digits = 2]{10.0}{7} \quad
\longdivision[1]{10.0}{7}
```

```
     1.428            1.42
7 ) 10.000       7 ) 10.00
     7                7
     3.0              3.0
     2.8              2.8
       20               20
       14               14
        60               6
        56
         4
```

`stage` = ⟨*nonnegative integer*⟩

This controls how many steps worth of division to do. Thanks to Cam McLeman for suggesting this feature.

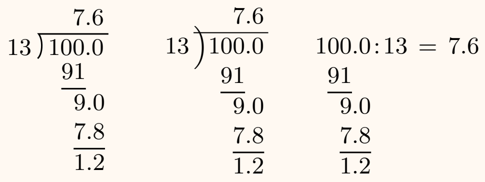
```
\longdivision[stage=0]{5.3}{37} \quad
\longdivision[stage=1]{5.3}{37} \quad
\longdivision[stage=2]{5.3}{37} \quad
\longdivision[stage=3]{5.3}{37} \quad
\longdivision[stage=4]{5.3}{37}
```



`style` = ⟨*style*⟩ (initially `standard`)

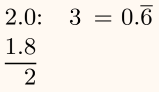
Control the style for typesetting the result of long division. The options are `default`, `standard`, `tikz`, or `german`. The option `default` is the same as `tikz` if Ti*k*Z is loaded and otherwise is the same as `standard`. You probably should load Ti*k*Z because the Ti*k*Z version looks significantly better. If you use this option, you'll probably want to set the style once and for all in your preamble with `\longdivisionkeys{style=`⟨*style*⟩`}`.

```
\intlongdivision[style = tikz    ]{100.0}{13} \quad
\intlongdivision[style = standard]{100.0}{13} \quad
\intlongdivision[style = german  ]{100.0}{13}
```



You can define your own typesetting style by saying `\longdiv_define_style:nn{`⟨*style name*⟩`}{`⟨*code*⟩`}`. This can use the commands `\longdivdividend` which contains the dividend, `\longdivdivisor` which contains the divisor, `\longdivquotient` which contains the quotient, and `\longdivwork:` which contains the `division work`. For instance, a simplified version of the `german` style is:

```
\longdivdefinestyle{my style}{%
     \begin{tabular}{@{}l@{}}
    \longdivdividend  : \, \longdivdivisor \,  = \longdivquotient \\
    \longdivwork
    \end{tabular}
}
\longdivision[style = my style]{2}{3}
```

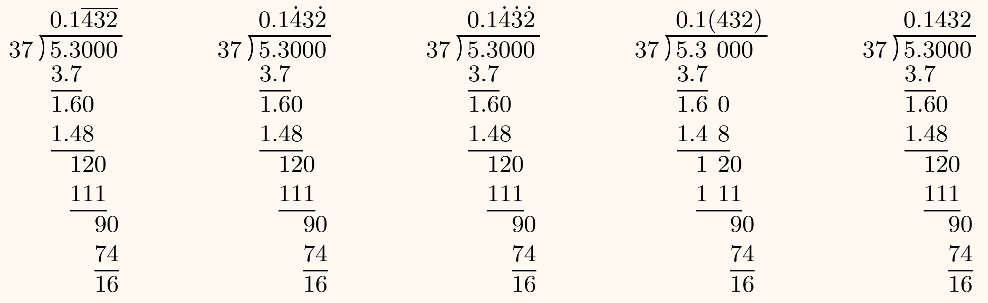


Send me an email if you cannot figure out how to make a style to your liking.

`repeating decimal style` = ⟨*style*⟩ (initially `overline`)

Control the way that repeating decimals are typeset. The options are `overline`, `dots`, `dots all`, `parentheses`, or `none`. The default is `overline`. The `parentheses` style creates ugly spacing problems and the `dots` style is insufficiently visible, so the `overline` style is the best. If you use this option, you'll probably want to set the style once and for all in your preamble with `\longdivisionkeys{recurring decimal style=`⟨*style*⟩`}`. Like the `style` key, this is designed to be extensible. However, the process of creating new `repeating decimal styles` is a bit involved. Send me an email if you want a new `repeating decimal style`.

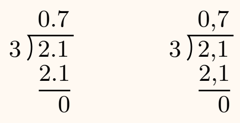
```
\longdivision[repeating decimal style = overline   ]{5.3}{37} \quad
\longdivision[repeating decimal style = dots       ]{5.3}{37} \quad
\longdivision[repeating decimal style = dots all   ]{5.3}{37} \quad
\longdivision[repeating decimal style = parentheses]{5.3}{37} \quad
\longdivision[repeating decimal style = none       ]{5.3}{37}
```



`decimal separator` = ⟨*separator character*⟩ (initially `.`)

Control the character used to indicated the decimal point. Most people want this to be a period or a comma. The default is a period. Note that this changes the decimal separator BOTH in the input and in the output. If you set the decimal separator to a comma and then use a period in the input, it will throw an error (though this could be inconvenient for people – if this behavior causes you trouble, email me and I can fix it). If you want to use the comma decimal separator, I recommend saying `\longdivisionkeys{decimal separator = {,}}` in your preamble.

```
\longdivision[decimal separator = {.}]{2.1}{3} \quad
\longdivision[decimal separator = {,}]{2,1}{3}
```



`digit separator` = ⟨*separator character*⟩ (initially `none`)

Control the character used to separate groups of digits in the output. By default digit groups have length 3, but that can be configured The digit separator will also be deleted from input strings. If value is empty, then no separator is used. Most people want this to be a period or a comma. Note that this changes the decimal separator BOTH in the input and in the output. If you set the decimal separator to a comma and then use a period in the input, it will throw an error.

```
\longdivision[digit separator = {,}]{5}{7} \quad
\longdivision[digit separator = {.}, decimal separator = {,}]{5}{7}
```

```
    0.714,285         0,714.285
 7 )5.000,000      7 )5,000.000
    4.9               4,9
     10                10
      7                 7
      30                30
      28                28
       2,0               2.0
       1,4               1.4
        60                60
        56                56
         40                40
         35                35
          5                 5
```

```
\longdivision[digit separator = {,}, digit group length = 2]{5}{7} \quad
```

```
    0.71,42,85
 7 )5.00,00,00
    4.9
     10
      7
      3,0
      2,8
       20
       14
        6,0
        5,6
         40
         35
          5
```

`separators in work` = ⟨*bool*⟩ (initially `true`)

Specifies whether to include the decimal and digit separators in division work. When this is false, `\longdivision` will leave a space instead so that the digits are aligned correctly.

```
\longdivision[separators in work = true ]{14.1}{3} \quad
\longdivision[separators in work = false]{14.1}{3}
```

```
     4.7            4.7
 3 )14.1        3 )14.1
    12             12
     2.1             2 1
     2.1             2 1
       0               0
```

`german division sign` = ⟨*division sign*⟩ (initially :)

```
\longdivisionkeys{style = german}
\longdivision[german division sign = $\,\div\,$ ]{14.1}{3} \quad
\longdivision[german division sign = :          ]{14.1}{3}
```

$$\begin{array}{l} 14.1 \div 3 \;=\; 4.7 \\ \underline{12} \\ 2.1 \\ \underline{2.1} \\ 0 \end{array} \quad \begin{array}{l} 14.1 : 3 \;=\; 4.7 \\ \underline{12} \\ 2.1 \\ \underline{2.1} \\ 0 \end{array}$$