

The geometry package

Hideo UMEKI

hideo.umeki@toshiba.co.jp

2002/07/08 v3.2

Abstract

This package provides a flexible and complete user interface to page dimensions. You can specify them by using intuitive parameters to get your desired page layout. For example, if you want to set margins (the left, right, top and bottom margins) to 2cm from each edge of the paper, what you need is just `\usepackage[margin=2cm]{geometry}`.

Contents

1	Preface to Version 3	1	5.5	Drivers	12
2	Introduction	2	5.6	Other Options	12
3	Page Geometry	3	6	Default Settings	13
3.1	Layout Dimensions	3	6.1	Default Layout	13
3.2	Auto-Completion Scheme	4	6.2	Configuration File	14
4	User Interface	7	7	Relations Between Options	14
4.1	General Features	7	7.1	Order Dependence	14
4.2	Option Types	8	7.2	Priority	14
5	Option Specification	8	8	Examples	15
5.1	Paper Size	8	9	Known Problems	16
5.2	Body Size	9	10	Acknowledgments	17
5.3	Margin Size	10			
5.4	Native Dimensions	11			

1 Preface to Version 3

The `geometry` package becomes even more flexible and powerful with the release of version 3. This new release contains major changes and enhancements in user interface, calculation schemes and the default settings of the page dimensions.

• New default layout.

The ‘automatic’ centering is no longer default layout. Instead of centering, the idea of margin ratio and common values for default settings are introduced: the ratio of left (inner) margin to right (outer) margin is set 1:1 (2:3 for twoside), and the ratio of top to bottom is set 2:3. The margin ratios can be specified by newly introduced options, e.g. `marginratio` (see Section 3.2 and 5.3 for the detail). In addition, the spaces for the head and foot of the page are disregarded in calculating the placement of the text area by default. Furthermore the default `scale` of the type area is set to 0.7 with 70% of the width and height of the paper. If you want to use the old default layout of version 2.3 or earlier, add `compat2` as a first option, e.g., `\usepackage[compat2,left=1.5in]{geometry}`, which sets the old default options [`scale={0.8,0.9}`, `centering`, `includeheadfoot`] and allows the subsequent options to behave as if they are used in the old version. See also Section 6.1 for the detail of the default layout.

- **Option twosideshift is obsolete.**
twoside and other geometry options can substitute for it. A new option bindingoffset might be also helpful to control margins for onside/twoside. For the detail, see Section 5.3.
- **Option includemp becomes independent of marginparwidth and marginparsep.**
In the previous version, marginparwidth or marginparsep automatically set includemp=true. Now if you want includemp mode, includemp should be set explicitly.
- **Options nohead, nofoot and noheadfoot become order-dependent and overwritable**
In the previous version, these options was order-independent: nohead,headsep=10pt resulted in just nohead (\headsep=0pt, \headheight=0pt), for example. But now they are overwritable by subsequent options. The above case results in \headheight=0pt and \headsep=10pt.
- **A complete set of options ignore* and include* for head, foot and marginpar.**
The previous version has only includemp, which denotes that the width of marginpar is included in the total body width. Now ignore{head, foot, headfoot, mp, all} and include{head, foot, headfoot, all} are newly added. If one of these ignore* is set, the corresponding space(s) are disregarded in auto-completion calculation. In version 3, ignoreall is set by default. So if you need to include the spaces for the head, foot and marginpar, the corresponding include* should be set explicitly. In addition, unlike the previous version, neither reversemp, marginparwidth nor marginparsep sets includemp automatically.
- **New option lines.**
The option enables users to specify \textheight by the number of lines included in \textheight, e.g., lines=20.
- **New option heightrounded.**
The option rounds \textheight to n -times (n : an integer) of \baselineskip plus \topskip to avoid “underfull vbox” in some cases.
- **New option screen.**
To make presentation with PC and video projector, geometry option screen, centering with ‘slide’ documentclass would be the best choice.
- **New option asymmetric.**
The option implements a twosided layout in which margins are not swapped on alternate pages and the marginal notes stay always on the same side.
- **New option showframe.**
The option displays visible frames for the text area and page, and lines for the head and foot to check layout in detail. Therefore showframe.sty is excluded from the geometry package distribution.
- **New option pass.**
The option disables auto-layout and all of the geometry settings except verbose and showframe. It can be used for checking out the page layout of the documentclass, other packages and manual settings without geometry.

See the text for the detail. All the new and modified options in this release are marked with ‘*3’ and ‘†3’ respectively.

2 Introduction

To set dimensions for page layout in L^AT_EX is not straightforward. You need to adjust several L^AT_EX native dimensions to place a text area where you want. If you want to center the text area in the paper you use, for example, you have to specify native dimensions as follows:

```

\usepackage{calc}
\setlength\textwidth{7in}
\setlength\textheight{10in}
\setlength\oddsidemargin{(\paperwidth-\textwidth)/2 - 1in}
\setlength\topmargin{(\paperheight-\textheight
-\headheight-\headsep-\footskip)/2 - 1in}.

```

Without package *calc*, the above example would need more tedious settings. Package *geometry* provides an easy way to set page layout parameters. In this case, what you have to do is just

```
\usepackage [text={7in,10in},centering]{geometry}.
```

Besides centering problem, setting margins from each edge of the paper is also troublesome. But *geometry* also make it easy. If you want to set each margin 1.5in, you can go

```
\usepackage [margin=1.5in]{geometry}
```

In both cases, the unspecified dimensions are automatically determined. The package will be also useful when you have to set page layout obeying the following strict instructions: for example,

The total allowable width of the text area is 6.5 inches wide by 8.75 inches high. The top margin on each page should be 1.2 inches from the top edge of the page. The left margin should be 0.9 inch from the left edge. The footer with page number should be at the bottom of the text area.

In this case, using *geometry* you can go

```
\usepackage [total={6.5in,8.75in},
top=1.2in, left=0.9in, includefoot]{geometry}.
```

Setting a text area on the paper in document preparation system has some analogy to placing a window on the background in the window system. The name ‘*geometry*’ comes from the *-geometry* option used for specifying a size and location of a window in X Window System.

3 Page Geometry

3.1 Layout Dimensions

To realize a straightforward setting for page layout, the following page structure is introduced: A paper contains a total body (printable area) and margins. The total body consists of a body (text area) with optional a header, a footer and marginal notes (*marginpar*). There are four margins: the left, right, top and bottom margins. For twosided documents, horizontal margins should be called the inner and outer margins.

paper : *total body and margins*
total body : *body (text area) (optional head, foot and marginpar)*
margins : *left(inner), right(outer), top and bottom*

Each margin is measured from the corresponding edge of a paper. For example, left margin (inner margin) means a horizontal distance between the left (inner) edge of the paper and that of the total body. Therefore the left and top margins defined in *geometry* are different from the native dimensions *\leftmargin* and *\topmargin*. The size of a body (text area) can be modified by *\textwidth* and *\textheight*.

The layout parts and the corresponding dimension names used in this package are showed schematically in Figure 1. The dimensions for paper, total body and margins have the following relations.

$$\text{paperwidth} = \text{left} + \text{width} + \text{right} \quad (1)$$

$$\text{paperheight} = \text{top} + \text{height} + \text{bottom} \quad (2)$$

The dimensions of the total body, *width* and *height*, are defined as follows:

$$\text{width} := \text{textwidth} (+\text{marginparsep} + \text{marginparwidth}) \quad (3)$$

$$\text{height} := \text{textheight} (+\text{headheight} + \text{headsep} + \text{footskip}) \quad (4)$$

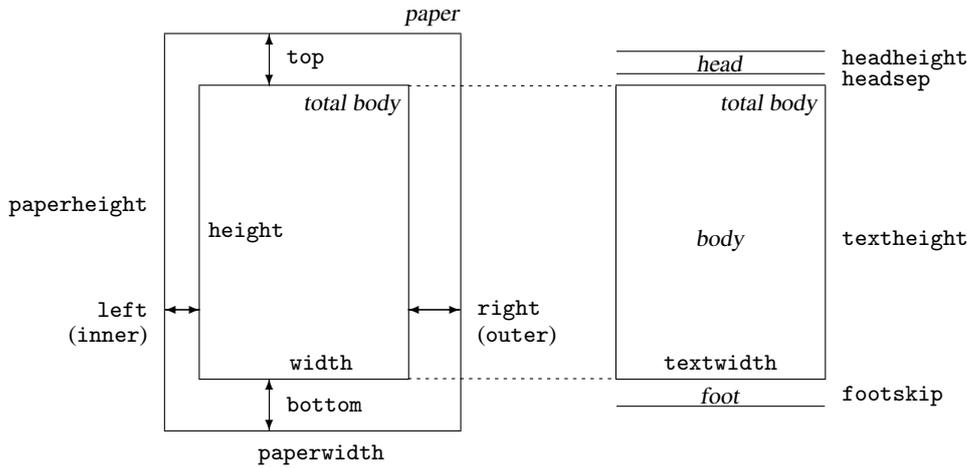


Figure 1: Dimension names used in the `geometry` package. $\text{width}=\text{textwidth}$ and $\text{height}=\text{textheight}$ by default. `left`, `right`, `top` and `bottom` are margins. If margins on verso pages are swapped by `twoside` option, margins specified by `left` and `right` options are used for the inside and outside margins respectively. `inner` and `outer` are aliases of `left` and `right` respectively.

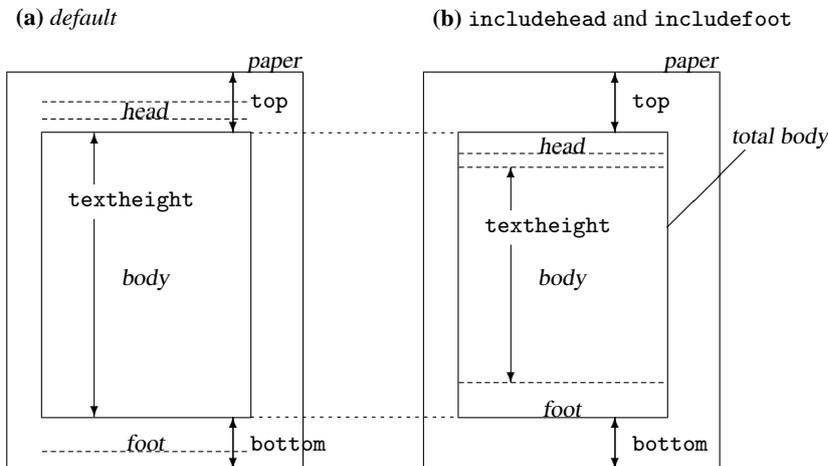


Figure 2: `includehead` and `includefoot` include the head and foot respectively into *total body*. (a) $\text{height} = \text{textheight}$ (default). (b) $\text{height} = \text{textheight} + \text{headheight} + \text{headsep} + \text{footskip}$ if `includehead` and `includefoot`. If the top and bottom margins are fixed, `includehead` and `includefoot` make `textheight` shorter than default.

In Equation (3), $\text{width}:=\text{textwidth}$ by default, but `marginparsep` and `marginparwidth` are included in width if `includemp` option is set true. In Equation (4), $\text{height}:=\text{textheight}$ by default. If `includehead` is set to true, `headheight` and `headsep` are considered as a part of height in the vertical completion calculation. In the same way, `includefoot` includes `footskip`. Note that options `ignore*` just exclude the corresponding spaces from `textheight`, but do not change those lengths themselves. Figure 2 shows how these options work. Each of the seven dimensions in the right-hand side of Equations (3) and (4) corresponds to the ordinary \LaTeX control sequence with the same name.

Figure 3 illustrates various layouts with different layout modes. The dimensions for a header and a footer can be controlled by `nohead` or `nofoot` mode, which sets each length to `0pt` directly. On the other hand, options `ignore*` do *not* change the corresponding native dimensions.

3.2 Auto-Completion Scheme

Suppose that the paper size is pre-defined in Equation (1) or (2), if two dimensions out of the three dimensions in the right-hand side of each equation are specified, the rest of the dimensions can be determined by the specified ones. However, when none or only one of the three dimensions is specified, the rest of the dimensions can't generally be determined without some assumptions.

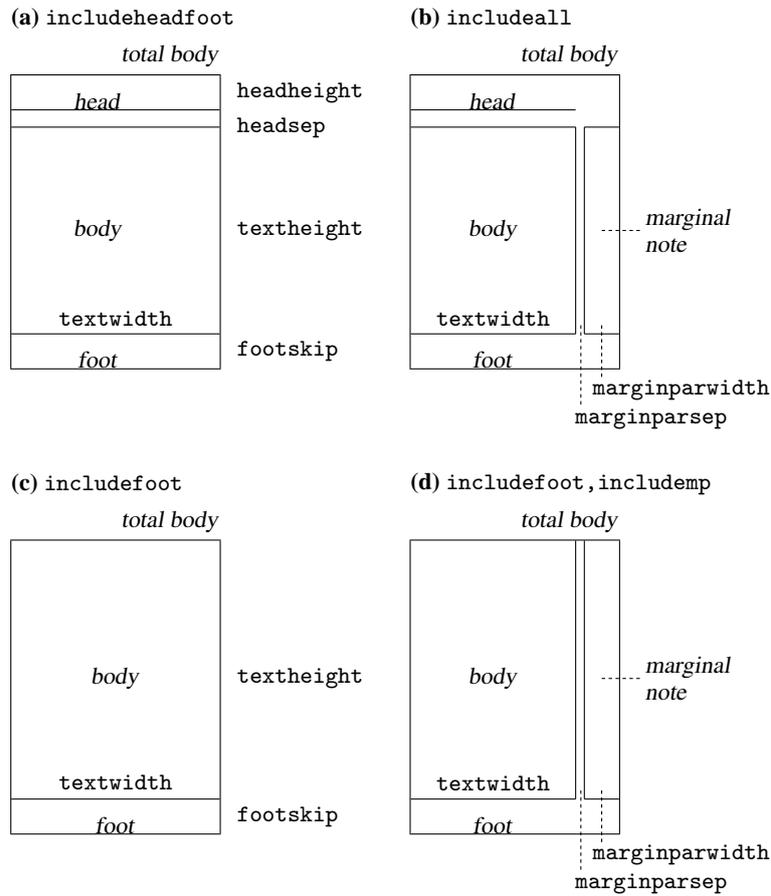


Figure 3: Sample layouts for *total body* with different switches. (a) `includeheadfoot`, (b) `includeall`, (c) `includefoot` and (d) `includefoot, includemp`. If `reversemp` is set to true, the location of the marginal notes are swapped on every page. Option `twoside` swaps both margins and marginal notes on verso pages. Note that the marginal notes are printed on the page, even when `ignoremp` or `includemp=false`, but can fall off the page in some cases.

The `geometry` package has an auto-completion scheme with some default parameters to determine the unspecified dimensions independently for each direction. If the size of *total body* (i.e., `width` in the horizontal direction) is specified, the margins (`left` and `right`) can be determined with a default ratio of one margin to the other (`left/right`). If one margin is specified, the rest of dimensions can also be determined by the default margin ratio. Page margin setting by margin ratio was introduced in KOMA script¹.

The default vertical margin ratio is $2/3$, namely,

$$\text{top} : \text{bottom} = 2 : 3 \quad \text{default.} \quad (5)$$

As for the horizontal margin ratio, the default value depends on whether the document is onesided or twosided,

$$\text{left (inner)} : \text{right (outer)} = \begin{cases} 1 : 1 & \text{default for oneside,} \\ 2 : 3 & \text{default for twoside.} \end{cases} \quad (6)$$

Obviously the default horizontal margin ratio for oneside is ‘centering’.

For example, if one specifies `right=2.4cm` with a *twosided* layout in A4 paper (21.0cm×29.7cm), unspecified `left` and `width` are automatically determined using the default horizontal margin ratio ($2/3$) as follows:

$$\begin{aligned} \text{left} &= \langle \text{horizontal-margin-ratio} \rangle \times \text{right} \\ &= 2/3 \times 2.4\text{cm} = 1.6\text{cm} \end{aligned} \quad (7)$$

$$\begin{aligned} \text{width} &= \text{paperwidth} - \text{left} - \text{right} \\ &= 21.0\text{cm} - 1.6\text{cm} - 2.4\text{cm} = 17.0\text{cm}. \end{aligned} \quad (8)$$

In this case, the vertical dimensions `top`, `height` and `bottom` are determined by the default vertical margin ratio with $2:3$ and the default size of *total body* with 70% of the paper height:

$$\begin{aligned} \text{height} &= 0.7 \times \text{paperheight} \\ &= 0.7 \times 29.7\text{cm} = 20.79\text{cm} \end{aligned} \quad (9)$$

$$\begin{aligned} \text{top} &= \frac{\langle \text{vertical-margin-ratio} \rangle}{1 + \langle \text{vertical-margin-ratio} \rangle} \times (\text{paperheight} - \text{height}) \\ &= \frac{2}{2 + 3} \times (29.7\text{cm} - 20.79\text{cm}) \\ &= 0.4 \times 8.91\text{cm} = 3.564\text{cm} \end{aligned} \quad (10)$$

$$\text{bottom} = 0.6 \times 8.91\text{cm} = 5.346\text{cm} \quad (11)$$

The auto-completion rules are shown in Table 1 and Equation (12). *A*, *B* and *C* in Table 1 are user-specified values, * denotes unspecified ones. The right-hand side table shows the corresponding results of auto-completion. The unspecified values can be determined by *A*, *B* and *L* (paperwidth or paperheight). In Table 1, functions $\mathcal{R}(x)$ and $\mathcal{M}(x)$ are defined as follows:

$$\begin{aligned} \mathcal{R}(x) &= L - x \\ \mathcal{M}(x) &= \mathcal{R}(x) / (1 + \sigma) \end{aligned} \quad (12)$$

Here σ denotes the ratio of left margin (inner) to right margin (outer) or the ratio of top to bottom. To set σ as a geometry option, you can use `{h,v}marginratio` options with a:b-type value, for example, `hmarginratio=2:3`.

$$\text{hmarginratio} = \text{left} : \text{right} \quad (13)$$

$$\text{vmarginratio} = \text{top} : \text{bottom} \quad (14)$$

By default, σ is $1/1$ ($=1$) for oneside and $2/3$ for twoside in the horizontal direction, and $2/3$ in the vertical. If none of three dimensions is specified in each direction, the default setting is used: width and height is set to 70% of the paper width and height respectively. If all the three dimensions would be specified, margins remain and width or height is ignored.

¹CTAN: macros/latex/contrib/supported/koma-script by Frank Neukam and Markus Kohm.

Settings				Results		
left	width	right		left	width	right
top	height	bottom		top	height	bottom
*	*	*		$\sigma\mathcal{M}(0.7L)$	$0.7L$	$\mathcal{M}(0.7L)$
*	A	*		$\sigma\mathcal{M}(A)$	A	$\mathcal{M}(A)$
A	*	*		A	$\mathcal{R}(A + A/\sigma)$	A/σ
*	*	A	\implies	σA	$\mathcal{R}(A + \sigma A)$	A
A	B	*		A	B	$\mathcal{R}(A + B)$
*	A	B		$\mathcal{R}(A + B)$	A	B
A	*	B		A	$\mathcal{R}(A + B)$	B
A	C	B		A	$\mathcal{R}(A + B)$	B

Table 1: Auto-completion rules. The mark ‘*’ in each row (left table) denotes the dimensions not specified explicitly, which can be determined as the corresponding Results (right table). σ denotes the value of margin ratio. Functions $\mathcal{R}(x)$ and $\mathcal{M}(x)$ are defined in Equation (12). The bottom case shows over-specification, which gives in the same result as the A -* $-B$ case.

4 User Interface

4.1 General Features

The geometry options using the `keyval` interface ‘ $\langle key \rangle = \langle value \rangle$ ’ can be set either in the optional argument to the `\usepackage` command, or in the argument of the `\geometry` macro. This macro, if necessary, should be used only in the preamble, i.e., before `\begin{document}`. In either case, the argument consists of a list of comma-separated `keyval` options. The main features of setting options are listed below.

- Multiple lines are allowed. (But blank lines are not allowed.)
- Any spaces between words are ignored.
- Options are basically order-independent.
(There are some exceptions. See Section 7.1 for details.)

For example,

```
\usepackage[ a5paper , hmargin = { 3cm,
                .8in } , height
            = 10in ]{geometry}
```

is equivalent to

```
\usepackage[height=10in,a5paper,hmargin={3cm,0.8in}]{geometry}
```

Some options are allowed to have sub-list, e.g. `{3cm,0.8in}`. Note that the order of values in the sub-list is significant. The above setting is also equivalent to the followings:

```
\usepackage{geometry}
\geometry{height=10in,a5paper,hmargin={3cm,0.8in}}
```

or

```
\usepackage[a5paper]{geometry}
\geometry{hmargin={3cm,0.8in},height=8in}
\geometry{height=10in}.
```

Thus, multiple use of `\geometry` just appends options.

Geometry supports package `calc`². For example,

```
\usepackage{calc}
\usepackage[teht=20\baselineskip+10pt]{geometry}
```

²CTAN:macros/latex/required/tools

4.2 Option Types

Geometry options are categorized into four types:

1. Boolean type

takes a boolean value (true or false). If no value, true is set by default.

$\langle key \rangle = \text{true} \mid \text{false}$.
 $\langle key \rangle$ with no value is equivalent to $\langle key \rangle = \text{true}$.

Examples: `verbose=true, includehead, twoside=false`.

Paper name is the exception. The preferred paper name should be set with no values. Whatever value is given, it is ignored. For instance, `a4paper=XXX` is equivalent to `a4paper`.

2. Single-valued type

takes a mandatory value.

$\langle key \rangle = \langle value \rangle$.

Examples: `width=7in, left=1.25in, footskip=1cm, height=.86\paperheight`.

3. Double-valued type

takes a pair of comma-separated values in braces. The two values can be shortened to one value if they are identical.

$\langle key \rangle = \{ \langle value1 \rangle, \langle value2 \rangle \}$.
 $\langle key \rangle = \langle value \rangle$ is equivalent to $\langle key \rangle = \{ \langle value \rangle, \langle value \rangle \}$.

Examples: `hmargin={1.5in,1in}, scale=0.8, body={7in,10in}`.

4. Triple-valued type

takes three mandatory, comma-separated values in braces.

$\langle key \rangle = \{ \langle value1 \rangle, \langle value2 \rangle, \langle value3 \rangle \}$

Each value must be a dimension or null. When you give an empty value or '*', it means null and leaves the appropriate value to the auto-completion mechanism. You need to specify at least one dimension, typically two dimensions. You can set nulls for all the values, but it makes no sense.

Examples:

`hdivide={2cm,*,1cm}, vdivide={3cm,19cm, }, divide={1in,*,1in}`.

5 Option Specification

This section describes all the options provided by `geometry`.

5.1 Paper Size

The options below set paper/media size and orientation.

`paper` | `papername`

specifies a paper name. The paper names available in `geometry`. `paper=\langle paper-name \rangle`.

For example `paper=a4paper`, which is equivalent to just `a4paper`.

`a0paper`, `a1paper`, `a2paper`, `a3paper`, `a4paper`, `a5paper`, `a6paper`

`b0paper`, `b1paper`, `b2paper`, `b3paper`, `b4paper`, `b5paper`, `b6paper`

`letterpaper`, `executivepaper`, `legalpaper`

specifies paper name. They can typically be used with no values. Note that whatever value (even `false`) is given to this option, the value will be ignored. For example, the followings have the same effect: `a5paper`, `a5paper=true`, `a5paper=false` and `a5paper=XXXX`.

^{*3} `screen` a special paper size with (W,H) = (225mm,180mm). For presentation with PC and video projector, "`screen,centering`" with 'slide' documentclass would be useful.

`paperwidth` width of the paper. `paperwidth=\langle length \rangle`.

paperheight	height of the paper. <code>paperheight=<length></code> .
papersize	width and height of the paper. <code>papersize={<width>, <height>}</code> or <code>papersize=<length></code> .
landscape	switches the paper orientation to landscape mode.
portrait	switches the paper orientation to portrait mode. This is equivalent to <code>landscape=false</code> .

Options for paper names (e.g., `a4paper`) and orientation (`portrait` and `landscape`) can be set as document class options. For example, you can set `\documentclass[a4paper,landscape]{article}`, then `a4paper` and `landscape` are processed in `geometry` as well. This is also the case for `twoside` and `twocolumn` (see also Section 5.4).

5.2 Body Size

The options specifying the size of *total body* are described in this section.

hscale	ratio of width of <i>total body</i> to <code>\paperwidth</code> . <code>hscale=<h-scale></code> , e.g., <code>hscale=0.8</code> is equivalent to <code>width=0.8\paperwidth</code> . (0.7 by default)
vscale	ratio of height of <i>total body</i> to <code>\paperheight</code> , e.g., <code>vscale=<v-scale></code> . (0.7 by default) <code>vscale=0.9</code> is equivalent to <code>height=0.9\paperheight</code> .
scale	ratio of <i>total body</i> to the paper. <code>scale={<h-scale>, <v-scale>}</code> or <code>scale=<scale></code> . (0.7 by default)
width totalwidth	width of <i>total body</i> . <code>width=<length></code> or <code>totalwidth=<length></code> . This dimension should not be confused with <code>textwidth</code> . Generally, <code>width ≥ textwidth</code> because <code>width</code> includes the width of the marginal notes if <code>includemp</code> is set to true. If <code>textwidth</code> and <code>width</code> are specified at the same time, <code>width</code> is ignored.
height totalheight	height of <i>total body</i> , excluding header and footer by default. If <code>includehead</code> or <code>includefoot</code> is set, <code>height</code> includes the head or foot of the page as well as <code>textheight</code> . <code>height=<length></code> or <code>totalheight=<length></code> . If both <code>textheight</code> and <code>height</code> are specified, <code>height</code> will be ignored.
total	width and height of <i>total body</i> . <code>total={<width>, <height>}</code> or <code>total=<length></code> .
textwidth	modifies <code>\textwidth</code> , the width of <i>body</i> (the text are). <code>textwidth=<length></code> .
textheight	modifies <code>\textheight</code> , the height of <i>body</i> . <code>textheight=<length></code> .
text body	sets both <code>\textwidth</code> and <code>\textheight</code> of the body of page. <code>body={<width>, <height>}</code> or <code>text=<length></code> .
* ³ lines	enables users to specify <code>\textheight</code> by the number of lines. <code>lines=<integer></code> .
* ³ includehead	includes the head of the page, <code>\headheight</code> and <code>\headsep</code> , into <i>total body</i> . It is set to false by default. It is opposite to <code>ignorehead</code> . See Figure 2.
* ³ includefoot	includes the foot of the page, <code>\footskip</code> , into <i>body</i> . It is opposite to <code>ignorefoot</code> . It is false by default. See Figure 2.
* ³ includeheadfoot	sets both <code>includehead</code> and <code>includefoot</code> to true, which is opposite to <code>ignoreheadfoot</code> . See Figure 2.
† ³ includemp	includes the margin notes, <code>\marginparwidth</code> and <code>\marginparsep</code> , into <i>body</i> when calculating horizontal calculation. In version 3, <code>includemp</code> is independent of options <code>marginparwidth</code> and <code>marginparsep</code> , and set to false by default.
* ³ includeall	sets both <code>includeheadfoot</code> and <code>includemp</code> to true. See Figure 2 and Figure 3.
* ³ ignorehead	disregards the head of the page, <code>headheight</code> and <code>headsep</code> , in determining vertical layout, but does not change those lengths. It is equivalent to <code>includehead=false</code> . It is set to true by default. See also <code>includehead</code> .
* ³ ignorefoot	disregards the foot of page, <code>footskip</code> , in determining vertical layout, but does not change that length. This option is set to true by default. See also <code>includefoot</code> .
* ³ ignoreheadfoot	sets both <code>ignorehead</code> and <code>ignorefoot</code> to true. See also <code>includeheadfoot</code> .

- *3 `ignoremp` disregards the marginal notes in determining the horizontal margins (`true` is set by default). If marginal notes fall off the page, the warning message will be displayed when `verbose=true`. See also Figure 3 and `includemp`.
- *3 `ignoreall` sets both `ignoreheadfoot` and `ignoremp` to `true`. See also `includeall`.
- *3 `heightrounded`
 This option rounds `\textheight` to n -times (n : an integer) of `\baselineskip` plus `\topskip` to avoid “underfull vbox” in some cases. For example, if `\textheight` is 486pt with `\baselineskip` 12pt and `\topskip` 10pt, then

$$(39 \times 12\text{pt} + 10\text{pt}) = 478\text{pt} < 486\text{pt} < 490\text{pt} (= 40 \times 12\text{pt} + 10\text{pt}),$$
 as a result `\textheight` is rounded to 490pt. `heightrounded=false` by default.

The following options can specify body and margins simultaneously with three comma-separated values in braces.

- `hdivide` horizontal partitions (`left,width,right`). `hdivide={\langle left margin \rangle, \langle width \rangle, \langle right margin \rangle}`. Note that you should not specify all of the three parameters. The best way of using this option is to specify two of three and leave the rest with `null(nothing)` or `*`. For example, when you set `hdivide={2cm, 15cm, }`, the margin from the right-side edge of page will be determined calculating `paperwidth-2cm-15cm`.
- `vdivide` vertical partitions (`top,height,bottom`). `vdivide={\langle top margin \rangle, \langle height \rangle, \langle bottom margin \rangle}`.
- `divide` `divide={A, B, C}` is interpreted as `hdivide={A, B, C}` and `vdivide={A, B, C}`.

5.3 Margin Size

The options specifying the size of visible margins are listed below.

- `left` | `lmargin` | `inner`
 left margin (for `oneside`) or inner margin (for `twoside`) of *total body*. In other words, the distance between the left (inner) edge of the paper and that of *total body*. `left=\langle length \rangle`. `inner` has no special meaning, just an alias of `left` and `lmargin`.
- `right` | `rmargin` | `outer`
 right or outer margin of *total body*. `right=\langle length \rangle`.
- `top` | `tmargin` top margin of the page. `top=\langle length \rangle`. Note this option has nothing to do with the native dimension `\topmargin`.
- `bottom` | `bmargin`
 bottom margin of the page. `bottom=\langle length \rangle`.
- `hmargin` left and right margin. `hmargin={\langle left margin \rangle, \langle right margin \rangle}` or `hmargin=\langle length \rangle`.
- `vmargin` top and bottom margin. `vmargin={\langle top margin \rangle, \langle bottom margin \rangle}` or `vmargin=\langle length \rangle`.
- `margin` `margin={A, B}` is equivalent to `hmargin={A, B}` and `vmargin={A, B}`. `margin=A` is automatically expanded to `hmargin=A` and `vmargin=A`.
- *3 `hmarginratio` horizontal margin ratio of left (inner) to right (outer). The value of `\langle ratio \rangle` should be specified with colon-separated two values. Each value should be a positive integer less than 100 to prevent arithmetic overflow, e.g., 2:3 instead of 1:1.5. The default ratio is 1:1 for `oneside`, 2:3 for `twoside`.
- *3 `vmarginratio` vertical margin ratio of top to bottom. The default ratio is 2:3.
- *3 `marginratio` | `ratio`
 horizontal and vertical margin ratios. `marginratio={\langle horizontal ratio \rangle, \langle vertical ratio \rangle}` or `marginratio=\langle ratio \rangle`.
- *3 `hcentering` sets auto-centering horizontally and is equivalent to `hmarginratio=1:1`. It is set to `true` by default for `oneside`. See also `hmarginratio`.
- *3 `vcentering` sets auto-centering vertically and is equivalent to `vmarginratio=1:1`. The default is `false`. See also `vmarginratio`.
- *3 `centering` sets auto-centering and is equivalent to `marginratio=1:1`. See also `marginratio`. The default is `false`. See also `marginratio`.

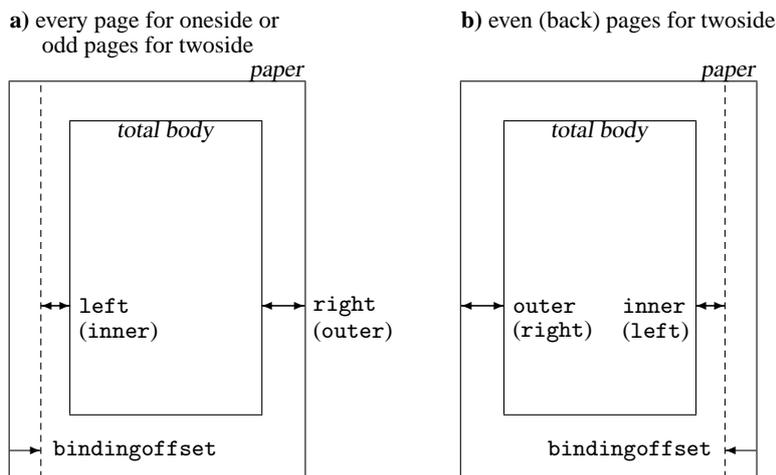


Figure 4: `bindingoffset` option. Note that `twoside` option swaps the horizontal margins and the marginal notes together with `bindingoffset` on even pages (see **b**)), but `asymmetric` option suppresses the swap of the margins and marginal notes (but `bindingoffset` is still swapped).

- `twoside` switches on twoside mode with left and right margins swapped on verso pages. The option sets `\@twoside` and `\@mparswitch` switches. See also `asymmetric`.
- ^{*3} `asymmetric` implements a twosided layout in which margins are not swapped on alternate pages (by setting `\oddsidemargin` to `\evensidemargin + bindingoffset`) and in which the marginal notes stay always on the same side. This option can be used as an alternative to the `twoside` option. See also `twoside`.
- ^{*3} `bindingoffset` removes a specified space from the lefthand-side of the page for oneside or the inner-side for twoside. `bindingoffset=<length>`. This is useful if pages are bound by a press binding (glued, stitched, stapled ...). See Figure 4.
- `hdivide` See description in Section 5.2.
- `vdivide` See description in Section 5.2.
- `divide` See description in Section 5.2.

5.4 Native Dimensions

The options below specify \LaTeX native dimensions and switches for page layout. See Figure 1. Note that unlike version 2.3, `nohead`, `nofoot` and `noheadfoot` become overwritable, in other words, just shorthand for setting the corresponding LaTeX dimensions (`\headheight`, `\headsep` and `\footskip`) to `0pt`.

- `headheight` | `head`
modifies `\headheight`, height of header. `headheight=<length>` or `head=<length>`.
- `headsep` modifies `\headsep`, separation between header and text (body). `headsep=<length>`.
- `footskip` | `foot`
modifies `\footskip`, distance separation between baseline of last line of text and baseline of footer. `footskip=<length>` or `foot=<length>`.
- ^{†3} `nohead` eliminates spaces for the head of the page, which is equivalent to both `\headheight=0pt` and `\headsep=0pt`.
- ^{†3} `nofoot` eliminates spaces for the foot of the page, which is equivalent to `\footskip=0pt`.
- ^{†3} `noheadfoot` equivalent to `nohead` and `nofoot`.
- `footnotesep` changes the dimension `\skip\footins`, separation between the bottom of text body and the top of footnote text. `\headheight=0pt`, `\headsep=0pt` and `\footskip=0pt`.
- ^{†3} `marginparwidth` | `marginpar`
modifies `\marginparwidth`, width of the marginal notes. `marginparwidth=<length>`. Unlike version 2.3, it does *not* set `includemp=true`.

^{†3} marginparsep	modifies <code>\marginparsep</code> , separation between body and marginal notes. <code>marginparsep=<length></code> . Unlike version 2.3, it does <i>not</i> set <code>includemp=true</code> .
^{*3} nomarginpar	shrinks spaces for marginal notes to <code>0pt</code> , which is equivalent to <code>\marginparwidth=0pt</code> and <code>\marginparsep=0pt</code> .
columnsep	modifies <code>\columnsep</code> , the separation between two columns in <code>twocolumn</code> mode.
hoffset	modifies <code>\hoffset</code> . <code>hoffset=<length></code> .
voffset	modifies <code>\voffset</code> . <code>voffset=<length></code> .
offset	horizontal and vertical offset. <code>offset={<hoffset>, <voffset>}</code> or <code>offset=<length></code> .
twocolumn	sets <code>twocolumn</code> mode with <code>\@twocolumntrue</code> . <code>twocolumn=false</code> denotes <code>onecolumn</code> mode with <code>\@twocolumnfalse</code> .
twoside	sets both <code>\@twosidettrue</code> and <code>\@mparswitchtrue</code> . See Section 5.3.
textwidth	sets <code>\textwidth</code> directly. See Section 5.2.
textheight	sets <code>\textheight</code> directly. See Section 5.2.
^{*3} reversemp	<code>reversemarginpar</code> makes the marginal notes appear in the left (inner) margin with <code>\@reversemargintrue</code> . Unlike version 2.3 or earlier, it does <i>not</i> change <code>includemp</code> mode. This is <code>false</code> by default.

5.5 Drivers

Package `geometry` supports `dvips`, `dvipdfm`, `pdflatex` and `VTEX` environment. These driver options are exclusive.

^{†3} dvips	writes the paper size in dvi output with the <code>\special</code> macro. If you use <code>dvips</code> as a DVI-to-PS driver, for example, to print a document with <code>\geometry{a3paper, landscape}</code> on A3 paper in landscape orientation, you don't need options " <code>-t a3 -t landscape</code> " to <code>dvips</code> . In version 3, this option sets an additional correction for landscape documents so that PostScript outputs shouldn't be displayed upside down by PostScript viewers, e.g., Ghostscript. If you use <code>VT_EX</code> environment or <code>pdflatex</code> command, this option is automatically deselected and changed to the corresponding driver option. This option works with <code>xdvi</code> and <code>dviout</code> (though you may get some warnings).
^{*3} dvipdfm	works like <code>dvips</code> except landscape correction.
pdftex	sets <code>\pdfpagewidth</code> and <code>\pdfpageheight</code> properly if <code>pdflatex</code> command is used for typeset. When <code>pdflatex</code> command is used, <code>pdftex</code> is automatically selected. On the other hand when one is not using <code>pdflatex</code> command this option is ineffective.
vtex	sets dimensions <code>\mediawidth</code> and <code>\mediaheight</code> for <code>VT_EX</code> . This option is automatically selected when one is using <code>VT_EX</code> environment. On the other hand when one is not using <code>VT_EX</code> this option is ineffective.

Drivers options can be automatically changed depending on the typeset environment.

environment	given driver option	→	resulted option
<code>latex</code>	<code>pdftex / vtex</code>	→	<code>none</code>
<code>pdflatex</code>	<code>any</code>	→	<code>pdftex</code>
<code>VT_EX</code>	<code>any</code>	→	<code>vtex</code> .

5.6 Other Options

The other useful options are described here.

verbose	displays parameter results on the terminal. <code>verbose=false</code> (default) still puts them into the log file.
reset	sets back the layout dimensions and switches to the settings before <code>geometry</code> is loaded. Options given in <code>geometry.cfg</code> are also cleared. Note that this cannot reset <code>pass</code> and <code>mag</code> with <code>truedimen</code> . <code>reset=false</code> has no effect and cannot cancel the previous <code>reset(=true)</code> if any. For example, when you go

```
\documentclass[landscape]{article}
\usepackage[twoside,reset,left=2cm]{geometry}
```

with `\ExecuteOptions{scale=0.9}` in `geometry.cfg`, then as a result, `landscape` and `left=2cm` remain effective, and `scale=0.9` and `twoside` are ineffective.

- `mag` sets magnification value (`\mag`) and automatically modifies `\hoffset` and `\voffset` according to the magnification. `mag=value`. Note that *value* should be an integer value with 1000 as a normal size. For example, `mag=1414` with `a4paper` provides an enlarged print fitting in `a3paper`, which is 1.414 ($=\sqrt{2}$) times larger than `a4paper`. Font enlargement needs extra disk space. **Note that you should not specify mag more than once.** Multiple `mag` specification causes an error. See also `truedimen` option.
- `truedimen` changes all internal explicit dimension values into *true* dimensions, e.g., `1in` is changed to `1truein`. Typically this option will be used together with `mag` option. Note that this is ineffective against externally specified dimensions. For example, when you set “`mag=1440, margin=10pt, truedimen`”, margins are not ‘true’ but magnified. If you want to set exact margins, you should set like “`mag=1440, margin=10truept, truedimen`” instead.
- *³ `pass` disables all of the geometry options and calculations except `verbose` and `showframe`. It can be used for checking out the page layout of the documentclass, other packages and manual settings without `geometry`.
- *³ `showframe` shows visible frames for the text area and page, and the lines for the head and foot on the first page.
- *³ `compat2` sets all kind of options so that `\usepackage[compat2]{geometry}` would behave as if one is using the old version (v2.3) with the old default layout: `[scale={0.8,0.9}, centering, includeheadfoot]`, which is here expressed by options available in version 3. Note this option should be set as a first option.

6 Default Settings

6.1 Default Layout

Let us recapitulate the default layout here. The `geometry` package has the following default page layout for onesided documents:

```
scale=0.7, marginratio={1:1, 2:3}, ignoreall
```

For `twoside`, the horizontal margin ratio is also set 2:3,

```
scale=0.7, marginratio=2:3, ignoreall.
```

Of course, you don’t need to set them explicitly. `\usepackage{geometry}` will internally set the above options. Additional options will overwrite the layout dimensions. For example,

```
\usepackage[hmargin=2cm]{geometry}
```

will overwrite horizontal dimensions, but use the default for vertical layout. Page dimensions specified by the documentclass being used and other direct settings before `geometry` is loaded are passed down to `geometry`.

Note version 2.3 or earlier had default layout different from the version 3. The old default options can be expressed with options available in the current version:

```
scale={0.8,0.9}, centering, includeheadfoot.
```

Adding `compat2` as a first option sets those options so that, for example,

```
\usepackage[compat2, width=10cm]{geometry}
```

would behave as if one is using the old version (v2.3).

6.2 Configuration File

One can set up a configuration file to make default options. To do this, produce a file `geometry.cfg` containing an `\ExecuteOptions` macro, for example,

```
\ExecuteOptions{a4paper,dvips}
```

and install it somewhere \TeX can find it.

The options specified in the `geometry.cfg` can be cleared by option `reset`.

7 Relations Between Options

This section shows how complexity is solved when options are over-specified.

7.1 Order Dependence

The `geometry` options are basically order-independent, but there are some exceptions. For multiple specification of the same option, the last setting is adopted. For example,

```
verbose=true, verbose=false
```

obviously results in `verbose=false`. If you set

```
hmargin={3cm,2cm}, left=1cm
```

the left(or inner) margin is overwritten by `left=1cm`. As a result, it is equivalent to `hmargin={1cm,2cm}`.

The `reset` option removes all the `geometry` options (except `pass`) before it. If you set

```
\documentclass[landscape]{article}
\usepackage[margin=1cm,twoside]{geometry}
\geometry{a5paper, reset, left=2cm}
```

then `margin=1cm`, `twoside` and `a5paper` are removed. As a result, this case is equivalent to

```
\documentclass[landscape]{article}
\usepackage[left=2cm]{geometry}
```

7.2 Priority

There are several ways to set dimensions of the printable area: `scale`, `total`, `text` and `lines`. Basically specification with the more concrete dimension has the higher priority:

$$\begin{array}{c} \text{low} \longrightarrow \text{high (priority)} \\ \left\{ \begin{array}{l} \text{hscale} \\ \text{vscale} \\ \text{scale} \end{array} \right\} < \left\{ \begin{array}{l} \text{width} \\ \text{height} \\ \text{total} \end{array} \right\} < \left\{ \begin{array}{l} \text{textwidth} \\ \text{textheight} \\ \text{text} \end{array} \right\} < \text{lines.} \end{array}$$

For example,

```
\usepackage[hscale=0.8, textwidth=7in, width=18cm]{geometry}
```

is the same as `\usepackage[textwidth=7in]{geometry}`. Another example:

```
\usepackage[lines=30, scale=0.8, text=7in]{geometry}
```

results in `[lines=30, textwidth=7in]`.

Options determining margin size also have priority rule: margin ratios versus margin length. For example, if both `marginratio=1:2` and `margin=1cm` are set at the same time, `margin=1cm` wins because `margin=1cm` is more concrete dimension than ratios. That is why normal margin options work well with default margin ratios (`marginratio={1:1, 2:3}` for oneside).

$$\begin{array}{c} \text{low} \longrightarrow \text{high (priority)} \\ \left\{ \begin{array}{l} \text{hmarginratio} \\ \text{vmarginratio} \\ \text{marginratio} \end{array} \right\} < \left\{ \begin{array}{l} \text{hmargin or left \& right} \\ \text{vmargin or top \& bottom} \\ \text{margin} \end{array} \right\}. \end{array}$$

8 Examples

- A onesided page layout with the text area centered in the paper. The examples below have the same result because the horizontal margin ratio is set 1:1 for oneside by default.

- centering
 - marginratio=1:1
 - vcentering

- A twosided page layout with the inside offset for binding 1cm.

- twoside, bindingoffset=1cm

In this case, `textwidth` is shorter than the case without `bindingoffset=1cm` by $0.7 \times 1\text{cm}$ ($=0.7\text{cm}$).

- A layout with the left, right, and top margin 3cm, 2cm and 2.5in respectively, with `textheight` of 40 lines, and with the head and foot of the page included in *total body*. The two examples below have the same result.

- left=3cm, right=2cm, lines=40, top=2.5in, includeheadfoot
 - hmargin={3cm,2cm}, tmargin=2.5in, lines=40, includeheadfoot

- A layout with the height of *total body* 10in, the bottom margin 2cm, and the default width. The top margin will be calculated automatically. Each solution below results in the same page layout.

- vdivide={*, 10in, 2cm}
 - bmargin=2cm, height=10in
 - bottom=2cm, textheight=10in

Note that dimensions for *head* and *foot* are excluded from height of *total body*. An additional `includefoot` makes `\footskip` included in `totalheight`. Therefore, in the two cases below, `textheight` in the former layout is shorter than the latter (with 10in exactly) by `\footskip`. In other words, `height = textheight + footskip` when `includefoot=true` in this case.

- bmargin=2cm, height=10in, includefoot
 - bottom=2cm, textheight=10in, includefoot

- A layout with `textwidth` and `textheight` 90% of the paper and with *body* centered. Each solution below results in the same page layout.

- scale=0.9, centering
 - text={.9\paperwidth,.9\paperheight}, ratio=1:1
 - width=.9\paperwidth, vmargin=.1\paperheight, marginratio=1:1
 - hdivide={*,0.9\paperwidth,*}, vdivide={*,0.9\paperheight,*}
 - margin={.1\paperwidth,.1\paperheight}, marginratio=1:1

You can add `heightrounded` to avoid an “underfull vbox warning” like

```
Underfull \vbox (badness 10000) has occurred while \output is active.
```

See Section 5.2 for the detail description about `heightrounded`.

- A layout with the width of marginal notes 3cm and included in the width of *total body*. The following examples are the same.

- marginparwidth=3cm, includemp
 - marginpar=3cm, igoremp=false

- A layout the full scale *body* of the paper with A5 paper in landscape. The following examples are the same.

- a5paper, landscape, scale=1.0
- landscape=TRUE, paper=a5paper, margin=0pt
- A screen size layout appropriate to presentation with PC and video projector.

```
\documentclass{slide}
\usepackage[screen,margin=0.8in]{geometry}
...
\begin{slide}
...
\end{slide}
```

- A layout with fonts and spaces both enlarged from A4 to A3. In the case below, the resulted paper size is A3.
 - a4paper, mag=1414.

If you want to have a layout with two times bigger fonts, but without changing paper size, you can go

- letterpaper, mag=2000, truedimen.

You can add dvips option, that is useful to preview it with proper paper size by dviout or xdvi.

- An old style setting with v2.3 or earlier

```
\usepackage[a4paper,mag=1200,truedimen,margin=2cm,
twosideshift=10pt,
headsep=7pt,headheight=14.5pt,
marginparwidth=30pt]{geometry}
```

can be rewritten with options in version 3 without compat2:

```
\usepackage{calc}
\usepackage[a4paper,mag=1200,truedimen,margin=2cm,
twoside, left=2cm+10pt, right=2cm-10pt,
includeheadfoot, headsep=7pt,headheight=14.5pt,
includemp, marginparwidth=30pt]{geometry}
```

In this case, includeall can be used instead of includeheadfoot and includemp.

- A complex page layout.

```
\usepackage[a5paper, landscape, twocolumn, twoside,
left=2cm, hmarginratio=2:1, includemp, marginparwidth=43pt,
bottom=1cm, foot=.7cm, includefoot, textheight=11cm, heightrounded,
columnsep=1cm, dvips, verbose]{geometry}
```

Try typesetting it and checking out the result yourself. :-)

9 Known Problems

- With pdftex=true, mag \neq 1000 and truedimen, paperwidth and paperheight shown in verbose mode are different from the real size of the resulted PDF. The PDF itself is correct anyway.
- With pdftex=true, mag \neq 1000, no truedimen, and hyperref, hyperref should be loaded by \usepackage before geometry. Otherwise the resulted PDF size will become wrong.
- With crop package and mag \neq 1000, center option of crop doesn't work well.

10 Acknowledgments

I would like to thank the following people for their pointing out bugs and suggesting, and for many helpful comments: Friedrich Flender, Piet van Oostrum, Keith Reckdahl, Peter Riocreux, James Kilfiger, Jean-Marc Lasgouttes Frank Bennett, Vladimir Volovich, Włodzimierz Macewicz, Jean-Bernard Addor, Michael Vulis (MicroPress), and Rolf Niepraschk.

I am deeply grateful to Frank Mittelbach for checking the codes patiently and providing extremely helpful insight and suggestions for version 3.