\textsc{\LaTeX} Spacing Tricks

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Boxes

- Inviolable space required by some typsetting element
- Could be one letter

- Has baseline, height, width, and depth
- Tricks for slanted styles
Glue

- Boxes are pasted together with *glue*
- Stretchable/shrinkable space
- *Letters* get glued together …
- *Words are then glued together*
- *Then lines…*
- Note that spaces are uniform horizontally & vertically
- The glue stretches to fill the allotted space
- The glue stretches to fill the space
 Modes

- Horizontal Mode – form letters into words, words into lines, lines into paragraphs.
- Vertical Mode – divide paragraphs into lines and form these, math, and other objects into pages.
- Math Mode – Obvious
- Subtleties: Internal vertical mode, restricted horizontal mode, display math mode
- Horizontal mode, restricted horizontal mode, and now back to horizontal mode
Sometimes important to know what mode \TeX is in

- \texttt{\textbackslash hspace} takes place in horizontal mode
- \texttt{\textbackslash vspace} delayed until vertical mode takes over
\texttt{\indent\vspace{.5in}} At the indentation of this sentence, \TeX\ went into horizontal mode. There is some display math mode here too:

$$\vspace{.5in}x_{\pm} = -\frac{b}{2a}\pm\frac{\sqrt{b^2-4ac}}{2a}.$$ 

\TeX\ typesets the entire paragraph into lines, but can only use the \texttt{\vspace} commands when in vertical mode, putting the lines together into a page.
Example

At the indentation of this sentence, \TeX went into horizontal mode. There is some display math mode here too:

\[
x_{\pm} = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}.
\]

\TeX typesets the entire paragraph into lines, but can only use the ~\texttt{\vspace~} commands when in vertical mode, putting the lines together into a page.
Spaces

- Basic space is \[\backslash\!\!\!:~\] backslash-space
- Provides a stretchable space, i.e. extra glue
- There are four extra spaces here.
- There are four extra spaces here. This line is only for comparison. Observe that the four extra spaces took up the space of three characters.
- Use \[\sim\] for a fixed-width unbreakable space, e.g. for use in names: K.\sim D.\sim Cooper
More spaces

Stretchable spaces – use anywhere
\[ \quad \quad O \quad O \]
\[ \text{quad} \quad O \quad O \]
\[ \text{qquad} \quad O \quad O \]

Math mode spaces
\[ ! \quad OO \]
\[ , \quad OO \]
\[ ; \quad OO \]
Arbitrary size spaces

- \hspace{\textit{length}} makes a horizontal space. Use anywhere.
- There is a \hspace{1\textit{in}} before this. There is also a \hspace{1\textit{in}} after “this”. Use \hspace* to force space even at line breaks.
- \vspace{\textit{height}} makes a vertical space. Use in vertical mode.

- There was a \vspace{.6\textit{in}} at the end of the previous line.
- Use \vspace* to force space even at a page break.
Fixed vertical spaces

- \texttt{\smallskip} – a small vertical space: follows this line.

- \texttt{\medskip} – a medium vertical space: follows this line.

- \texttt{\bigskip} – a big vertical space: follows this line.

Equivalent to e.g. \texttt{\vspace{\medskipamount}}

Can change these amounts: \texttt{\medskipamount=20pt}
Fills

- Infinitely stretchable/shrinkable space
- \texttt{\textbackslash hfill} can fill a line, e.g.
  \begin{verbatim}
  left . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . right
  \end{verbatim}
- Likewise, \texttt{\textbackslash hrulefill} fills with a line, \texttt{\textbackslash dotfill} fills with dots.
  \begin{verbatim}
  left . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . right
  \end{verbatim}
- \texttt{\textbackslash vfill} does same in vertical
- Beware: if the box has variable width or height, the fills will default to zero length.
Margins

- Remember that \TeX was designed for producing books. We might need to leave paper for binding.
- \texttt{evensidemargin} – left margin for even numbered pages
- \texttt{oddsidemargin} – left margin for odd numbered pages
- \texttt{textwidth} – width of text area. The right margin is whatever is left over.
- \texttt{topmargin}, \texttt{textheight} control vertical text area.
- We usually set these in the preamble.
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- We usually set these in the preamble.

\begin{verbatim}
\oddsidemargin=1.5in
\setlength{\oddsidemargin}{1.5in}
\end{verbatim}
Point is that certain *variables* control page size and position.

- `\parskip` – distance between paragraphs
- `\parindent` – indentation at beginning of paragraph
- `\baselineskip` – distance between baselines of text lines

Some of these can be reset by environments. In particular, `\baselineskip` is set by document environment, so to change it, you must do so *inside* the document.
Sometimes you need to set text in a fixed area.

\( \text{\textbackslash makebox}[\text{width}]{\text{content}} \) sets \text{content} in a box of width \text{width}.

\( \text{\textbackslash makebox}[.8\text{\textwidth}]{\text{\textbackslash hrulefill This is officially .8\textwidth wide}} \).

\________\This is officially .8\textwidth wide.

N.B. you can specify lengths as a number times a variable, where multiplication is denoted by adjacency.
Other boxes

- If you want to see the box, you can use a `\framebox`

To make a box that uses multiple lines, use e.g.,
`\parbox{2.0in}{...}`

- To make a box that is vertically aligned off the baseline, use `\raisebox{2ex}{...}`. Positive lengths denote raising the box above the baseline; negative lengths put the base of the box below the baseline.
You can make a rectangular blob of ink using \texttt{\textbackslash rule}.

\texttt{\textbackslash rule\{1in\}\{.2mm\}} gives ________.

\texttt{\textbackslash rule\{.1in\}\{.5\textbackslash baselineskip\}} gives ■.

Making a rule of 0 thickness can be a good way of forcing space in horizontal or math mode. Such a rule is called a \textit{strut}.

This line has a strut: \texttt{\textbackslash rule[-.25in]\{0in\}\{.5in\}}

The optional length moves the strut down from the baseline by a quarter inch.

\texttt{\textbackslash strut} gives a strut as tall as the default line height.