LaTeX Guide for when I forget: Preamble Commands

March 19, 2020

Symbol	Command		In the Preamble	Description
			STATISTICAL VALUES	
$\mathbb{E}[X]$	`\Ex{X}`	‡	`\newcommand\Ex[1]{\mathbb{E}\left[ #1 \right]}`	expected value
$\mathrm{Var}(X)$	`\Var{X}`	‡	`\newcommand\Var[1]{\text{Var}\left( #1 \right)}`	variance
$\mathrm{Cov}(X,Y)$	`\Cov{X,Y}`	‡	`\newcommand\Cov[1]{\text{Cov}\left( #1 \right)}`	Covarinace
$\mathrm{Corr}(X,Y)$	`\Cor{X,Y}`	‡	`\newcommand\Cor[1]{\text{Corr}\left( #1 \right)}`	Correlation
$\mathrm{s.e.}(X)$	`\se{X}`	‡	`\newcommand\se[1]{\text{s.e.}\left( #1 \right)}`	standard error
$\mathrm{s.d.}(X)$	`\sd{X}`	‡	`\newcommand\sd[1]{\text{s.d.}\left( #1 \right)}`	standard deviation
$\mathrm{c.v.}(X)$	`\cv{X}`	‡	`\newcommand\cv[1]{\text{c.v.} \left( #1 \right)}`	co-efficent of variance
$\overline{\underline{X}}$	`\bars{X}`	‡	`\newcommand{\bars}[1]{\underline{\overline{#1}}}`	upper and lower bars
OR	`\OR`	†	`\newcommand{\OR}{\text{OR}}`	Odds Ratio (OR)
$\mathrm{odds}_{\mathrm{sub}}$	`\odds{sub}`	‡	`\newcommand{\odds}[1]{\text{odds}_{\text{#1}}}`	odds with subscript
			TILDE $\sim$ `\sim`	
$\overset{X}{\sim}$	`\simm{X}`	‡	`\newcommand{\simm}[1]{\stackrel{#1}{\sim}}`	tilde with math on top
$\overset{\text{text}}{\sim}$	`\simt{text}`	‡	`\newcommand{\simt}[1]{\stackrel{\text{#1}}{\sim}}`	tilde with text on top
$\overset{\perp\!\!\!\perp}{\sim}$	`\simin`	‡	`\newcommand{\simin}{\stackrel{\independent}{\sim}}`	follows independent distribution
$\overset{\text{iid}}{\sim}$	`\simiid`	‡	`\newcommand{\simiid}{\stackrel{\text{iid}}{\sim}}`	follows iid distributions
			INFINITY ∞ `\infty` and CONVERGENCE $\to$ `\to`	
as $n \to \infty$	`\asn`	‡	`\newcommand{\asn}{\text{ as } n \to \infty}`	as n to infinity
as $t \to \infty$	`\astto`	‡	`\newcommand{\astto}{\text{ as } t \to \infty}`	as t to infinity
$n \to \infty$	`\nto`	‡	`\newcommand{\nto}{n \to \infty}`	n to infinity
$t \to \infty$	`\tto`	‡	`\newcommand{\tto}{t \to \infty}`	t to infinity
$\xrightarrow{\mathcal{P}}$	`\conprob`	‡	`\newcommand{\conprob}{\stackrel{\Ps}{\to}}`	converge in probability
$\xrightarrow{\mathcal{L}}$	`\conlaw`	‡	`\newcommand{\conlaw}{\stackrel{\Ls}{\to}}`	converge in law
$\xrightarrow{\mathcal{D}}$	`\condist`	‡	`\newcommand{\condist}{\stackrel{\Ds}{\to}}`	converge in distribution

† Denotes commands that were created to be used in math mode, but it's not required

‡ Denotes commands that **need** to be in math mode

Symbol	Command	In the Preamble	Description
		MATHEMATICAL OPERATORS, OPERATIONS	
$\langle X, Y \rangle$	`\inn{X, Y}`	‡ `\newcommand{\inn}[1]{\left\langle#1\right\rangle}`	inner product
$\|X\|$	`\norm{X}`	‡ `\newcommand{\norm}[1]{\left\lVert#1\right\rVert}`	Norm
$\lvert X \rvert$	`\abs{X}`	‡ `\newcommand{\abs}[1]{\left\lvert#1\right\rvert}`	Absolute Value
$\sum$	`\ssum`	‡ `\newcommand{\ssum}{\textstyle\sum}`	small sum
$\perp\!\!\!\perp$	`\independent`	‡ `\newcommand\independent{\protect\mathpalette{\protect\independenT}{\perp}} \def\independenT#1#2{\mathrel{\rlap{$#1#2$}\mkern2mu{#1#2}}}`	Independent symbol
$\mathbb{1}$	`\ind`	‡ `\newcommand{\ind}{\mathbbm{1}}`	indicator function
$\boldsymbol{P}_X$	`\pj{X}`	‡ `\newcommand{\pj}[1]{\pmb{P}_{#1}}`	projection matrix
$\boldsymbol{P}_{\boldsymbol{\omega}}$	`\Pw`	‡ `\newcommand{\Pw}{\pmb{P_{\omega}}}`	projection operator for $\boldsymbol{\omega}$
$\boldsymbol{P}_{\boldsymbol{\omega}_0}$	`\Pwo`	‡ `\newcommand{\Pwo}{\pmb{P}_{\pmb{\omega}_0}}`	projection operator for $\boldsymbol{\omega}_0$
		TEXT WITH SYMBOLS IN MATH MODE	
$\overset{\text{then}}{\Longrightarrow}$	`\then`	‡ `\newcommand{\then}{\stackrel{\text{then}}{\implies}}`	implies arrow with 'then' text
$\overset{\text{Then}}{\Longrightarrow}$	`\Then`	‡ `\newcommand{\then}{\stackrel{\text{Then}}{\implies}}`	implies arrow with 'Then' text
$\overset{\text{then}}{\Longrightarrow}$	`\thenm`	`\newcommand{\thenm}{$\stackrel{\text{then}}{\implies}$}`	implies arrow with 'then' text, out of math mode
$\overset{\text{def}}{=}$	`\df`	‡ `\newcommand{\df}{\stackrel{\text{def}}{=}}`	define as ...
$\overset{\text{set}}{=}$	`\set`	‡ `\newcommand{\set}{\stackrel{\text{set}}{=}}`	set as ...

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Symbol	Command		In the Preamble	Description
			TEXT IN MATH MODE	
p-value	`\pval`	†	`\newcommand{\pval}{\text{$p$-value}}`	pval text
vs	`\vs`	†	`\newcommand{\vs}{\text{ vs }}`	text '_vs_' for hypothesis test, H_0 vs H_1 `$H_0 \vs H_1$`
as	`\as`	†	`\newcommand{\as}{\text{ as }}`	text '_as_', x as y `$x \as y$`
BN	`\BNt`	†	`\newcommand{\BNt}{\text{BN}}`	BN (Binomial distribution short hand)
Bias	`\Bias`	†	`\newcommand{\Bias}{\text{Bias}}`	Bias
sign	`\sgn`	†	`\newcommand{\sgn}{\text{sign}}`	sign
span	`\spn`	†	`\newcommand{\spn}{\text{span}}`	span
str	`\str`	†	`\newcommand{\str}{\text{str}}`	stratified sampling
			TEXT DISTRIBUTION FULL NAMES IN MATH MODE	
Beta	`\BetaD`	†	`\newcommand{\BetaD}{\text{Beta}}`	Beta
Bernoulli	`\Bern`	†	`\newcommand{\Bern}{\text{Bernoulli}}`	Bernoulli
Binomial	`\Binom`	†	`\newcommand{\Binom}{\text{Binomial}}`	Binomial
Exponential	`\Expon`	†	`\newcommand{\Expon}{\text{Exponential}}`	Exponential
Gamma	`\Gamm`	†	`\newcommand{\Gamm}{\text{Gamma}}`	Gamma
Multinomial	`\Multinom`	†	`\newcommand{\Multinom}{\text{Multinomial}}`	Multinomial
Poisson	`\Pois`	†	`\newcommand{\Pois}{\text{Poisson}}`	Poisson
Uniform	`\Unif`	†	`\newcommand{\Unif}{\text{Uniform}}`	Uniform
			WRITING PROOFS	
□	`\qed`		`\newcommand{\qed}{\phantom{x} \hfill $\square$}`	hfill the line then add square, to denote end of proof
⋆	`\prop`		`\newcommand{\prop}{\phantom{x} \hfill $\star$}`	hfill the line then add star, to denote proposition

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Symbol	Command	In the Preamble	Description
		LETTERS WITH LINE	
$\mathbb{C}$	`\C`	‡ `\newcommand{\C}{\mathbb{C}}`	Complex numbers
$\mathbb{E}$	`\E`	‡ `\newcommand{\E}{\mathbb{E}}`	Expected Value
$\mathbb{I}$	`\I`	‡ `\newcommand{\I}{\mathbb{I}}`	Identity Matrix
$\mathbb{N}$	`\N`	‡ `\newcommand{\N}{\mathbb{N}}`	Natural number, $\mathbb{Z}^+$
$\mathbb{P}$	`\pr`	‡ `\newcommand{\pr}{\mathbb{P}}`	Probability
$\mathbb{Q}$	`\Q`	‡ `\newcommand{\Q}{\mathbb{Q}}`	Rational Numbers
$\mathbb{R}$	`\R`	‡ `\newcommand{\R}{\mathbb{R}}`	Real numbers
$\mathbb{Z}$	`\Z`	‡ `\newcommand{\Z}{\mathbb{Z}}`	Integers
		BOLD LETTERS/CHARACTERS	
$\boldsymbol{X}$	`\Xb`	‡ `\newcommand{\Xb}{\pmb{X}}`	Uppercase X
$\boldsymbol{x}$	`\xb`	‡ `\newcommand{\xb}{\pmb{x}}`	Lowercase x
$\boldsymbol{\beta}$	`\betab`	‡ `\newcommand{\betab}{\pmb{\beta}}`	Lowercase beta
$\boldsymbol{\Sigma}$	`\Sigmab`	‡ `\newcommand{\Sigmab}{\pmb{\Sigma}}`	Uppercase Sigma, variance covariance matrix
$\mathbf{0}$	`\ob`	‡ `\newcommand{\ob}{\pmb{0}}`	Bold zero, vector or matrix of zero's
$\mathbf{1}$	`\1`	‡ `\newcommand{\1}{\pmb{1}}`	Bold one, vector or matrix of one's
Similar newcommands are used for multiple letters; bold letters used to denote vectors and/or matrices			
		SCRIPT LETTERS	
$\mathcal{I}$	`\Is`	‡ `\newcommand{\Is}{\mathcal{I}}`	Fisher's Information
$\mathcal{N}$	`\Ns`	‡ `\newcommand{\Ns}{\mathcal{N}}`	Normal Distribution
Similar newcommands are used for multiple letters; often used to denote distributions			

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Symbol	Command	In the Preamble	Description
		MISCELLANIOUS	
———	`\xdash`	`\newcommand{\xdash}[1][3em]{\rule[0.5ex]{#1}{0.55pt}}`	dash line
⓪	`\circled{0}`	`\newcommand\circled[1]{\tikz[baseline=(char.base)]{\node [shape=circle,draw,inner sep=2pt] (char) {#1};}}`	for characters in circle
⓪	`\cir[0]`	`\newcommand{\cir[1]}{$\circled{#1}$}`	short-hand circled
	`\phant`	`\newcommand{\phant}{\phantom{x}}`	phantom character (sometimes need for hfill or other commands if nothing else is on the line)
X	`\highlight{X}`	`\newcommand{\highlight}[1]{\colorbox{blue!10} {$\displaystyle#1$}}`	highlight
CHECK!	`\chk`	`\newcommand{\chk}{\textcolor{red}{\text{CHECK!}}}`	check
OUTSTANDING: x	`\outstanding{x}`	`\newcommand{\outstanding}[1]{\textcolor{red}{\text{OUT STANDING: }\text{#1}}}`	specify outstanding tasks
`code`	`\code {code}`	`\definecolor{litgray}{RGB}{240, 240, 240} \newcommand \code[1]{\colorbox{litgray}{\small{\texttt{{#1}}}}}`	inline code

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`\newcommand*` or `\newcommand`

"Using the starred version of `\newcommand*` means that the arguments of the defined command cannot contain a blank line or `\par`. This makes it a lot easier to spot runaway arguments." - Source

Renew Commands, setup commands, etc

Customized Underline

Source: https://alexwlchan.net/2017/10/latex-underlines/

```
\usepackage{contour} %fill in around text
\usepackage{ulem} %using fancy underlining (wave, dots, etc.)
        %new underline command
        \renewcommand{\ULdepth}{1.8pt}
        \contourlength{0.8pt}
        \newcommand{\myuline}[1]{
                \uline{\phantom{#1}}
                \llap{\contour{white}{#1}}
                }
```

abcd efgh `\underline{abcd} \quad \underline{efgh}`

abcd efgh `\myuline{abcd} \quad \myuline{efgh}`

Captions in Tables are justified (left-aligned) vs centered

Source: https://github.com/haozhu233/kableExtra/issues/194

```
\usepackage{caption}
\DeclareCaptionLabelSeparator*{spaced}{\\[2ex]}
\captionsetup[table]{format=plain,justification=justified,
singlelinecheck=false,labelsep=spaced,skip=0pt}
```

Setting Indent

Did not save source :(

```
\usepackage{indentfirst} %indent first paragraph in section
\newlength\tindent
\setlength{\tindent}{\parindent}
\setlength{\parindent}{0pt} %SENT INDENT TO ZERO
\renewcommand{\indent}{\hspace*{\tindent}}
```

Creating Fourth Section

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```
\setcounter{secnumdepth}{5} %5 so that it's in table of contents
\setcounter{tocdepth}{5} %5 so that its in table of contents
\titleformat{\paragraph}
{\normalfont\normalsize\itshape}{\theparagraph}{1em}{}
\titlespacing*{\paragraph}
{0pt}{3.25ex plus 1ex minus .2ex}{1.5ex plus .2ex}
```

Pictures in Multicolumn environment

Source: https://tex.stackexchange.com/questions/12262/multicol-and-figures

```
\documentclass[a5paper]{article}
\usepackage{multicol,caption}
\usepackage[demo]{graphicx}
\usepackage{lipsum}
\newenvironment{Figure}
{\par\medskip\noindent\minipage{\linewidth}}
{\endminipage\par\medskip}

\begin{document}

\begin{multicols}{2}
\lipsum[1]
\begin{Figure}
\centering
\includegraphics[width=\linewidth]{myimage.png}
\end{Figure }

\lipsum[1]
\end{multicols}

\end{document}
```