NYU - Tandon School of Engineering

Tandon Bridge - LaTeX Reference Guide

1 Basic

1.1 Creating Document

```
\documentclass{article}
\usepackage{amsmath}
\begin{document}
      ⋮
\end{document}
```

1.2 Sectioning

Use * for showing *title* only without the section number.

```
\Section{Section Title}
\Section*{Section Title}
\Subsection{Sub-Section Title}
\Subsubsection {Sub-Sub-Section Title}
```

1.3 Breaking

`\\`	*line break*
`\newpage`	*start a new page*

1.4 Font Styles

`\textbf{Boldface}`	**Boldface**
`\textit{Italics}`	*Italics*
`\texttt{Typewriter}`	`Typewriter`

1.5 Colour

```
\usepackage{color}
 \textcolor{red}{Text colour in Red}
 \colorbox{cyan}{Box background colour in Cyan}
```

Text colour in Red

Box background colour in Cyan

1.6 Enumerate & Itemize

```
\begin{enumerate}
  \item{Item A}
  \item{Item B}
  \begin{enumerate}
   \item{Item c}
   \item[d)]{Item d}
  \end{enumerate}
\end{enumerate}
```

1. Item A
2. Item B
   (a) Item c
   d) Item d

```
\begin{itemize}
  \item{Item A}
  \item{Item B}
  \begin{itemize}
   \item{Item c}
   \item[*]{Item d}
  \end{itemize}
\end{itemize}
```

- Item A
- Item B
  - Item c
  * Item d

1.7 Tabular

Use | inside the {cols} for vertical line. Use \hline for horizontal line.
l - left-aligned. r - right-aligned. c - centered.

```
\begin{tabular}{|l|cc|r|} \hline
  Number & Bit 1 & Bit 2 & Bit String \\ \hline
  1 & 0 & 0 & 00 \\
  2 & 0 & 1 & 01 \\
  3 & 1 & 0 & 10 \\
  4 & 1 & 1 & 11 \\ \hline
\end{tabular}
```

Number	Bit 1	Bit 2	Bit String
1	0	0	00
2	0	1	01
3	1	0	10
4	1	1	11

1.8 Reserved Characters

\#	#	\$	$	\%	%	\&	&	\{	{
\}	}	_	_	\~{}	~	\^{}	^	\textbackslash	\

2 Mathematical Typesetting

Mathematical typesetting can be done in math mode or display math mode. Most of the symbols are available in the amsmath package by $\mathcal{AMS}$.
\usepackage{amsmath}

2.1 Math Mode & Display Math Mode

Math mode for inline mathematical formula.

```
p or q can be denoted as \(p \vee q \)
```

p or q can be denoted as $p \vee q$

```
p and q can be denoted as $p \wedge q$
```

p and q can be denoted as $p \wedge q$

Display math mode generates the mathematical typeset outside of the text.

```
\begin{displaymath}
  (x + y)^2 = x^2 + 2xy + y^2
\end{displaymath}
```

$$(x + y)^2 = x^2 + 2xy + y^2$$

amsmath package equation structures. Use * to omit the number.

```
\begin{equation}
  \sum_{i=0}^{k} a_i=a_0+a_1+ \dots +a_k
\end{equation}
```

$$\sum_{i=0}^{k} a_i = a_0 + a_1 + \cdots + a_k \tag{1}$$

```
\begin{equation*}
  P(n, r) = \frac{n!}{(n-r)!}
\end{equation*}
```

$$P(n, r) = \frac{n!}{(n-r)!}$$

2.2 Subscripts & Superscripts

`x^6x^4 = x^{6 + 4}`	$x^6x^4 = x^{6+4}$	`TEXT$^{\text{Superscript}}$`	$\text{TEXT}^{\text{Superscript}}$
`A_{16} = 1010_{2}`	$A_{16} = 1010_2$	`TEXT$^{\text{Subscripts}}$`	$\text{TEXT}_{\text{Subscripts}}$

2.3 Mathematics Constructions in LaTeX

`\frac{x-y}{x+\frac{1}{y}}`	$\frac{x-y}{x+\frac{1}{y}}$	`\cfrac{x-y}{x+\cfrac{1}{y}}`	$\cfrac{x-y}{x+\cfrac{1}{y}}$
`\sqrt{x - y}`	$\sqrt{x-y}$	`\sqrt[89]{x - y}`	$\sqrt[89]{x-y}$

2.4 Symbols

Some of the symbols are from `amssymb` package. Include `\usepackage{amssymb}` to use those symbols.

`\wedge`	$\wedge$	`\vee`	$\vee$	`\neg`	$\neg$	`\oplus`	$\oplus$
`\rightarrow`	$\rightarrow$	`\leftrightarrow`	$\leftrightarrow$	`\equiv`	$\equiv$	`\forall`	$\forall$
`\exists`	$\exists$	`\therefore`	$\therefore$	`\not\equiv`	$\not\equiv$	`\leq`	$\leq$
`\geq`	$\geq$	`\neq`	$\neq$	`\times`	$\times$	`\div`	$\div$
`\subset`	$\subset$	`\subseteq`	$\subseteq$	`\in`	$\in$	`\notin`	$\notin$
`\cap`	$\cap$	`\cup`	$\cup$	`\blacksquare`	$\blacksquare$	`\because`	$\because$
`\varnothing`	$\varnothing$	`\emptyset`	$\emptyset$	`\nexists`	$\nexists$	`\infty`	∞
`\nsubseteq`	$\nsubseteq$	`\not\subset`	$\not\subset$	`\approxeq`	$\approxeq$	`\approx`	$\approx$
`\spadesuit`	$\spadesuit$	`\heartsuit`	$\heartsuit$	`\clubsuit`	$\clubsuit$	`\diamondsuit`	$\diamondsuit$
`\nmid`	$\nmid$						

2.5 Blackboard Bold Symbol

`\mathbb{N}`	$\mathbb{N}$	`\mathbb{Z}`	$\mathbb{Z}$	`\mathbb{Z^+}`	$\mathbb{Z}^+$	`\mathbb{Q}`	$\mathbb{Q}$
`\mathbb{R}`	$\mathbb{R}$	`\mathbb{R^+}`	$\mathbb{R}^+$				

2.6 Delimiters

`|-x|` $|-x|$ `\lfloor 3.14159 \rfloor` $\lfloor 3.14159 \rfloor$ `\lceil 2.71828 \rceil` $\lceil 2.171828 \rceil$

`\left\lfloor \frac{x}{y} \right\rfloor` $\left\lfloor \frac{x}{y} \right\rfloor$ `\left\lfloor \frac{x}{y} \right\rfloor` $\left\lfloor \frac{x}{y} \right\rfloor$

2.7 Variable-Sized Symbols

The size of the symbols will be different in math mode and display math mode.

`\bigcap` $\bigcap$ `\bigcup` $\bigcup$ `\sum` $\sum$ `\prod` $\prod$

2.8 Overline

```
\overline{A \cup \overline{B}} = \overline{A} \cap B
```

$$\overline{A \cup \overline{B}} = \overline{A} \cap B$$

2.9 Greek Letters

2.9.1 Lower Case

\alpha	α	\beta	β	\gamma	γ	\delta	δ
\epsilon	ϵ	\zeta	ζ	\eta	η	\theta	θ
\iota	ι	\kappa	κ	\lambda	λ	\mu	μ
\nu	ν	\xi	ξ	o (omicron)	o	\pi	π
\rho	ρ	\sigma	σ	\tau	τ	\upsilon	υ
\phi	ϕ	\chi	χ	\psi	ψ	\omega	ω

2.9.2 Upper Case

A (Alpha)	A	B (Beta)	B	\Gamma	Γ	\Delta	Δ
E (Epsilon)	E	Z (Zeta)	Z	H (Eta)	H	\Theta	Θ
I (Iota)	I	K (Kappa)	K	\Lambda	Λ	M (Mu)	M
N (Nu)	N	\Xi	Ξ	O (Omicron)	O	\Pi	Π
P (Rho)	P	\Sigma	Σ	T (Tau)	T	\Upsilon	Υ
\Phi	Φ	X (Chi)	X	\Psi	Ψ	\Omega	Ω

2.10 Function Name

\ln	ln	\lim	lim	\log	log	\log_2	$\log_2$
\max	max	\min	min	\exp	exp	\Pr	Pr

2.11 Dots

\cdots	$\cdots$	\ddots	$\ddots$	\ldots	$\ldots$	\vdots	$\vdots$
\dotsc	$\ldots$	\dotsb	$\cdots$	\dotsm	$\cdots$	\dotsi	$\cdots$

2.12 Matrices

```
\begin{equation*}
  \begin{pmatrix}
   n \\
   r
  \end{pmatrix}
  = \frac{n!}{r!(n-r)!}
\end{equation*}
```

$$\begin{pmatrix} n \\ r \end{pmatrix} = \frac{n!}{r!(n-r)!}$$

2.13 Cases

```
\begin{equation*}
  |x| = \begin{cases}
    x \quad :x \geq 0 \\
    -x \quad :x < 0
  \end{cases}
\end{equation*}
```

$$|x| = \begin{cases} x & : x \geq 0 \\ -x & : x < 0 \end{cases}$$

2.14 XY-pic

It uses the `xy` package. Include `\usepackage[all]{xy}` to use `xymatrix`.
`@R` - Row space. `@C` - Column space. `u` - up. `d` - down. `l` - left. `r` - right.

```
\xymatrix@R=18pt@C=48pt{
  x \ar[dr] & a \\
  y \ar[dr] & b \\
  z \ar[uur] & c
}
```