# $\LaTeX Lecture~2$

### Tareq

July 6, 2019

# 1 Figures

### 1.1 Single Figure

Figures need graphicx package.

\usepackage{graphicx}.

\begin{figure}[h]
\centering
\includegraphics[width=0.3\textwidth]{buetlogo.png}
\caption{Logo of BUET}
\label{fig:logobuet}
\end{figure}



Figure 1: Logo of BUET

### 1.2 Multiple Figures

You have to include subcaption package for side by side images.

\usepackage{subcaption}

\begin{figure}[h]

```
\centering
\begin{subfigure}{0.4\textwidth}
\centering
\includegraphics[width=0.8\textwidth]{ubuntulogo.png}
\caption{Ubuntu}
\end{subfigure}
~
\begin{subfigure}{0.4\textwidth}
\centering
\includegraphics[width=0.8\textwidth]{kalilogo.png}
\caption{Kali Linux}
\end{subfigure}
\caption{Linux Distributions}
\end{figure}
```

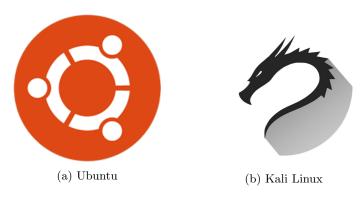


Figure 2: Linux distributions

# 2 Equation

### 2.1 Simple Equation

This is a simple equation: a + a = 2a \$a + a = 2a\$ This is not math mode: a + a = 2a.

## 3 Superscript and Subscript

Use  $\_$  for subscript, e.g.  $a_n$  shows  $a_n$ . Use  $\widehat{}$  for superscript, e.g.  $a^n$  shows  $a^n$ . Use  $\}$  to group more than one characters, e.g.  $a_{in}$  shows  $a_{in}$ . More complex equation,  $\sin =0$  a i shows

$$\sum_{i=0}^{n} a_i$$

#### **Mathematical Environments** 3.1

Inline:  $\sum_{i=0}^n a_i$ 

Inline with displaystyle: \$\displaystyle\sum\_{i=0}^n a\_i\$

Block level: \$\$\sum\_{i=0}^n a\_i\$\$ Block level with equation number:

\begin{equation}  $\sum_{i=0}^n a_i$ \end{equation}

Notice the difference in output.

Inline:  $\sum_{i=0}^{n} a_i$ 

Inline with displays tyle:  $\sum_{i=0}^{n} a_i$ 

Block level:

$$\sum_{i=0}^{n} a_i$$

Block level with equation number:

$$\sum_{i=0}^{n} a_i \tag{1}$$

#### 3.2 Miscellaneous

For some of the commands, you need to include amsmath package.

Comparisons:

 $\$  < \leq \\$ shows, <\leq  $$ > \geq$ 

Set operations:

\forall x \in X, \exists y \leq \epsilon

$$\forall x \in X, \exists y \leq \epsilon$$

A \cap B, A \cup B

$$A\cap B, A\cup B$$

Limits and Infinity:

 $\lim_{x \to \infty} \sup(-x) = 0$ 

$$\lim_{x \to \infty} \exp(-x) = 0$$

Fractions:

\frac{a}{b}

 $\frac{a}{h}$ 

Binomials:

 $\binom{n}{k}$ 

Times:

a \times b

 $a \times b$ 

Root:

square root:  $\sqrt{a}$ , \sqrt{a} nth root:  $\sqrt[n]{a}$ , \sqrt[n]{a}

Modular:

a \bmod b, a \pmod b, a \equiv b

 $a \mod b, a \pmod{b}, a \equiv b$ 

Integrals:

\int\_a^b xdx

 $\int_{a}^{b} x dx$ 

Plus minus:

a pm 5, a mp 5

 $a \pm 5, a \mp 5$ 

Trigonometry:

 $\cos 2\theta = \cos^2 - \sin^2 \theta$ 

 $\cos 2\theta = \cos^2 - \sin^2$ 

Custom operator:

 $\text{cos}^2 = \text{cos}^2 - \text{sin}^2$ 

$$\cos 2\theta = \cos^2 - \sin^2$$

### 3.3 Autometic Sizing of Parentheses/Braces/Brackets

(\frac{a}{b})

 $(\frac{a}{b})$ 

\left(\frac{a}{b}\right)

 $\left(\frac{a}{b}\right)$ 

### 3.4 Matrices

### matrix

\begin{equation}
\begin{matrix}
1 & 0 & 0\\
0 & 1 & 0\\
0 & 0 & 1\\
\end{matrix}
\end{equation}

### pmatrix

\begin{equation}
\begin{pmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1 \\
\end{pmatrix}
\end{equation}

$$\begin{pmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1
\end{pmatrix}$$
(3)

bmatrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \tag{4}$$

Change the matrix environment to pbBvV matrix in the following equation and observe the output:

### 4 Bibliography

Process of compiling external bib file (assuming tex file name is doc.tex, it does not matter what the bib file name is):

```
pdflatex doc.tex
bibtex doc
pdflatex doc.tex
pdflatex doc.tex
```

Refer to a work/paper/journal by \cite{tag}. You can get BibTex from Google Scholar.

For example, Convolutional Neural Network (CNN) [2] has been successfully applied in various areas of computer vision. Large datasets like ImageNet [1] can be used in training a CNN.

### References

- [1] Jia Deng, Wei Dong, Richard Socher, Li-Jia Li, Kai Li, and Li Fei-Fei. Imagenet: A large-scale hierarchical image database. In 2009 IEEE conference on computer vision and pattern recognition, pages 248–255. Ieee, 2009.
- [2] Yann LeCun, Léon Bottou, Yoshua Bengio, Patrick Haffner, et al. Gradient-based learning applied to document recognition. *Proceedings of the IEEE*, 86(11):2278–2324, 1998.