LaTeX for Beginner I
GSHS LaTeX Study

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Gyeonggi Science High School
for the gifted

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Outline

1. Why LATEX?

2. Beginning LATEX

3. Font

4. Paragraph

5. Sections

6. Title

7. Equations

8. Figures

9. Further Subjects

Why LaTeX?

- **Free:** No cost to make and to view.
- **PDF:** Its result is the pdf format, the standard document granted by ISO.
- **No mouse:** You can make a document just by typing keyboard.
- **Speed:** The more proficient, therefore, the faster.
- **Look:** Nice and boundless mathematical formulas.
- **Vector format:** Images and graphs of a vector format (e.g. eps, pdf) keep their quality.
- **Codebase:** Fast conversion between papers and presentations.
- **Unconstrained from OS:**
- **Light:** Minimized GUI. Keyboard shortcuts are replaced by commands.
- **WYSIWYM:** Just writing text. Low computer resource. No lag.
- **Automatic formation of ToC, LoF, LoT, Labels of equations, figures, and tables, …**

But...

- **Unfamiliar:** In general, one uses WYSIWYG style.

- **Minimized GUI, Codebase:** Higher entry barrier for beginner.

- **Weak support for 한글**

But...

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(Advantages of LATEX) − (Disadvantages of LATEX)

But...

- **Unfamiliar:** In general, one uses WYSIWYG style.

- **Minimized GUI, Codebase:** Higher entry barrier for beginner.

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(Advantages of LaTeX) − (Disadvantages of LaTeX)=(POSITIVE)

Outline

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Installing LaTeX

Install LaTeX

- http://latex.gs.hs.kr/
- https://namu.wiki/w/LaTeX

or you can use LaTeX online

- https://ko.sharelatex.com/
- https://www.overleaf.com/

Hereafter this manual is written for the LaTeX installed in your pc.

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Make '*.tex' File

Make a text file of the extension 'tex'

\documentclass[11pt]{article}

Preamble

\begin{document}

Body

\end{document}

Make '*.tex' File

In the body,

```
She's gone
Out of my life
```

then you have

She's gone Out of my life

In the body,

```
She's gone

Out of my life
```

you have

She's gone
Out of my life

In the body,

```
She's gone\par
Out of my life
```

you get

She's gone
Out of my life

Outline

Font Size

\tiny{ABCD}	ABCD
\scriptsize{ABCD}	ABCD
\footnotesize{ABCD}	ABCD
\small{ABCD}	ABCD
\normalsize{ABCD}	ABCD
\large{ABCD}	ABCD
\Large{ABCD}	ABCD
\LARGE{ABCD}	ABCD
\huge{ABCD}	ABCD
\Huge{ABCD}	ABCD

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Font Families

Family

- roman \textrm{roman}
- sans serif \textsf{sans serif}
- typewriter \texttt{typewriter}

Series

- medium \textmd{medium}
- **boldface** \textbf{boldface}

Shape

- upright \textup{upright}
- *italic* \textit{italic}
- *slanted* \textsl{slanted}
- SMALL CAP \textsc{small cap}

Times New Roman

If you want to use 'times new roman' font, write the following in the preamble

```
\usepackage{mathptmx}
\usepackage[T1]{fontenc}
\usepackage[utf8]{inputenc}
```

Outline

Alignment

In the body

```
\begin{center}
\LARGE\textbf{Why \LaTeX?}
\par\vspace{1em}
\large\textsf{GSHS \LaTeX\ Workshop 2018}
\end{center}
The default style of paragraph alignment is fully-justified paragraph. Copy
and paste the previous sentence ten times here in order to make this
paragraph longer.
\begin{flushleft}
The 'flushleft' environment makes the paragraph the left-justified text.
Again, copy and paste the previous sentence ten times here, to make this
paragraph longer.
\end{flushleft}
\begin{flushright}
\textit{Chinook Mok}
\end{flushright}
```

Alignment

you get

Why LaTeX?

GSHS LaTeX Workshop 2018

The default style of paragraph alignment is fully-justified paragraph. Copy and paste the previous sentence ten times here in order to make this paragraph longer.

The 'flushleft' environment makes the paragraph the left-justified text. Again, copy and paste the previous sentence ten times here, to make this paragraph longer.

Chinook Mok

Outline

Sections

In the body,

```
\section{She's Gone}

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can
't live without her love. In my life there's just an empty space. All my
dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me
? My heart belongs to you. Lady, can you forgive me? For all I've done to
you. Lady, oh, lady.

\section{Bohemian Rhapsody}

Is this the real life? Is this just fantasy? Caught in a landslide. No
escape from reality. Open your eyes. Look up to the skies and see. I'm just
a poor boy, I need no sympathy. Because I'm easy come, easy go, a little
high, little low. Anyway the wind blows, doesn't really matters to me, to me
.
```

Sections

you get

1 She's Gone

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can't live without her love. In my life there's just an empty space. All my dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me? My heart belongs to you. Lady, can you forgive me? For all I've done to you. Lady, oh, lady.

2 Bohemian Rhapsody

Is this the real life? Is this just fantasy? Caught in a landslide. No escape from reality. Open your eyes. Look up to the skies and see. I'm just a poor boy, I need no sympathy. Because I'm easy come, easy go, a little high, little low. Anyway the wind blows, doesn't really matters to me, to me.

Subsections

In the body,

```
\section{She's Gone}

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can
't live without her love. In my life there's just an empty space. All my
dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me
? My heart belongs to you. Lady, can you forgive me? For all I've done to
you. Lady, oh, lady.

\subsection{Bohemian Rhapsody}

Is this the real life? Is this just fantasy? Caught in a landslide. No
escape from reality. Open your eyes. Look up to the skies and see. I'm just
a poor boy, I need no sympathy. Because I'm easy come, easy go, a little
high, little low. Anyway the wind blows, doesn't really matters to me, to me
.
```

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1 She's Gone

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can't live
without her love. In my life there's just an empty space. All my dreams are lost.
I'm wasting away. Forgive me, girl. Lady, won't you save me? My heart belongs
to you. Lady, can you forgive me? For all I've done to you. Lady, oh, lady.

1.1 Bohemian Rhapsody

Is this the real life? Is this just fantasy? Caught in a landslide. No escape from
reality. Open your eyes. Look up to the skies and see. I'm just a poor boy, I need
no sympathy. Because I'm easy come, easy go, a little high, little low. Anyway
the wind blows, doesn't really matters to me, to me.

Section—Modification

In the preamble,

```
\usepackage{secdot}
\sectiondot{subsection}
```

then you get

1. She's Gone

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can't live without her love. In my life there's just an empty space. All my dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me? My heart belongs to you. Lady, can you forgive me? For all I've done to you. Lady, oh, lady.

1.1. Bohemian Rhapsody

Is this the real life? Is this just fantasy? Caught in a landslide. No escape from reality. Open your eyes. Look up to the skies and see. I'm just a poor boy, I need no sympathy. Because I'm easy come, easy go, a little high, little low. Anyway the wind blows, doesn't really matters to me, to me.

Section—Modification

In the preamble,

```
\renewcommand{\thesection}{\Roman{section}}
\renewcommand{\thesubsection}{\thesection.\roman{subsection}}
```

then you get

I. She's Gone

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can't live without her love. In my life there's just an empty space. All my dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me? My heart belongs to you. Lady, can you forgive me? For all I've done to you. Lady, oh, lady.

I.i. Bohemian Rhapsody

Is this the real life? Is this just fantasy? Caught in a landslide. No escape from reality. Open your eyes. Look up to the skies and see. I'm just a poor boy, I need no sympathy. Because I'm easy come, easy go, a little high, little low. Anyway the wind blows, doesn't really matters to me, to me.

Section—Reference

In the body,

```
\section{She's Gone}\label{sec:shes_gone}

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can
't live without her love. In my life there's just an empty space. All my
dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me
? My heart belongs to you. Lady, can you forgive me? For all I've done to
you. Lady, oh, lady. In the section \ref{sec:bohemian} we'll meet '\emph{
Queen}'!

\section{Bohemian Rhapsody}\label{sec:bohemian}

Is this the real life? Is this just fantasy? Caught in a landslide. No
escape from reality. Open your eyes. Look up to the skies and see. I'm just
a poor boy, I need no sympathy. Because I'm easy come, easy go, a little
high, little low. Anyway the wind blows, doesn't really matters to me, to me
. In the section \ref{sec:shes_gone}, we had met '\emph{Steel Heart}'!
```

then you get

1. She's Gone

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can't live without her love. In my life there's just an empty space. All my dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me? My heart belongs to you. Lady, can you forgive me? For all I've done to you. Lady, oh, lady. In the section 2 we'll meet '*Queen*'!

2. Bohemian Rhapsody

Is this the real life? Is this just fantasy? Caught in a landslide. No escape from reality. Open your eyes. Look up to the skies and see. I'm just a poor boy, I need no sympathy. Because I'm easy come, easy go, a little high, little low. Anyway the wind blows, doesn't really matters to me, to me. In the section 1, we had met '*Steel Heart*'!

Outline

Title

In the preamble,

```
\title{\textbf{Let's Sing!}}
\author{Chinook Mok}
\date{\small\today}
```

In the body,

```
\maketitle
```

you get

Let's Sing!

Chinook Mok

March 22, 2018

1. She's Gone

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can't live without her love. In my life there's just an empty space. All my dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me? My heart belongs to you. Lady, can you forgive me? For all I've done to you. Lady, oh, lady. In the section 2 we'll meet '*Queen*'!

2. Bohemian Rhapsody

Is this the real life? Is this just fantasy? Caught in a landslide. No escape from reality. Open your eyes. Look up to the skies and see. I'm just a poor boy, I need

Title—Affiliation

In the preamble,

```
\usepackage{authblk}

\title{\textbf{Let's Sing!}}
\author{Chinook Mok}
\affil{GSHS}
\author{Sowon}
\author{Yerin}
\author{Yuju}
\affil{GFRIEND}
\date{\small\today}
```

In the body,

```
\maketitle
```

you get

Let's Sing!

Chinook Mok

GSHS

Sowon, Yerin, and Yuju

GFRIEND

March 22, 2018

1. She's Gone

She's gone out of my life. I was wrong, I'm to blame, I was so untrue, I can't live without her love. In my life there's just an empty space. All my dreams are lost. I'm wasting away. Forgive me, girl. Lady, won't you save me? My heart belongs

Outline

Equations—Single line

In the preamble,

```
\usepackage{amsmath}
```

In the body,

```
Two objects of mass $m_1$ and $m_2$ are located at $\mathbf{r}_1$ and $
\mathbf{r}_2$, respectively. The force exerted on the body of $m_1$ due to
that of $m_2$ is given by
\begin{equation}
\mathbf{F}_{12} =-G\frac{m_1 m_2}{r^2}\hat{\mathbf{r}}_{12}.\label{eq:grav_
force}
\end{equation}
where $G\approx (20/3)\times 10^{-11}\,\mathrm{m^3 kg^{-1}s^{-2}}$ is the
universal gravitational constant, $r=|\mathbf{r}_1 -\mathbf{r}_2 |$ is the
distance from $m_2$ to $m_1$, and $\hat{\mathbf{r}}_{12}$ is the unit vector
 of $\mathbf{r}_{12} \equiv\mathbf{r}_1 -\mathbf{r}_2$.
```

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Equations—Single line

you get

Two objects of mass m_1 and m_2 are located at $\mathbf{r}_1$ and $\mathbf{r}_2$, respectively. The force exerted on the body of m_1 due to that of m_2 is given by

$$\mathbf{F}_{12} = -G\frac{m_1 m_2}{r^2}\hat{\mathbf{r}}_{12}. \tag{1}$$

where $G \approx (20/3) \times 10^{-11}\,\mathrm{m}^3\mathrm{kg}^{-1}\mathrm{s}^{-2}$ is the universal gravitational constant, $r = |\mathbf{r}_1 - \mathbf{r}_2|$ is the distance from m_2 to m_1, and $\hat{\mathbf{r}}_{12}$ is the unit vector of $\mathbf{r}_{12} \equiv \mathbf{r}_1 - \mathbf{r}_2$.

Equations—Multi lines

In the body,

```
\begin{equation}
\begin{split}
\frac{d\omega_b^2}{dt}=(\gamma_L -\gamma_d )\omega_b^2 &-\frac{\gamma_L}{2}
\int_{t/2}^t dt_1 \int_{t-t_1}^{t_1} dt_2 (t-t_1 )^2 \\
& e^{-\nu_a (2t-t_1 -t_2 )} \omega_b^2 (t_1)\omega_b^2(t_2)\omega_b^2(t+t_2
-t_1).
\end{split}
\label{eq:BBmodel}
\end{equation}
```

we get

$$\frac{d\omega_b^2}{dt} = (\gamma_L - \gamma_d)\omega_b^2 - \frac{\gamma_L}{2}\int_{t/2}^t dt_1 \int_{t-t_1}^{t_1} dt_2(t-t_1)^2$$
$$e^{-\nu_a(2t-t_1-t_2)}\omega_b^2(t_1)\omega_b^2(t_2)\omega_b^2(t+t_2-t_1). \tag{1}$$

Equations—Multi lines

In the body,

```
\begin{align}
\oint_S \mathbf{E}\cdot d\mathbf{A} &=\int_V \frac{\rho}{\epsilon_0}\mathrm{
d}V \label{eq:Gauss}\\
\oint_S \mathbf{B}\cdot d\mathbf{A} &=0 \label{eq:No_Monopole_B}\\
\oint_C \mathbf{E}\cdot d\mathbf{l} &=-\frac{\partial}{\partial t}\int_S
\mathbf{B}\cdot\mathrm{d}\mathbf{A} \label{eq:Faraday}\\
\oint_C \mathbf{B}\cdot d\mathbf{\mathcal{l}} &=\mu_0 \int_S \mathbf{J}\cdot
\mathrm{d}\mathbf{A}+\mu_0 \epsilon_0 \frac{\partial}{\partial t}\int_S
\mathbf{E}\cdot\mathrm{d}\mathbf{A} \label{eq:Ampere}
\end{align}
```

we get

$$\oint_S \mathbf{E} \cdot d\mathbf{A} = \int_V \frac{\rho}{\varepsilon_0} \mathrm{d}V \qquad (1)$$

$$\oint_S \mathbf{B} \cdot d\mathbf{A} = 0 \qquad (2)$$

$$\oint_C \mathbf{E} \cdot d\mathbf{l} = -\frac{\partial}{\partial t}\int_S \mathbf{B} \cdot \mathbf{dA} \qquad (3)$$

$$\oint_C \mathbf{B} \cdot d\mathbf{l} = \mu_0 \int_S \mathbf{J} \cdot \mathbf{dA} + \mu_0 \varepsilon_0 \frac{\partial}{\partial t}\int_S \mathbf{E} \cdot \mathbf{dA} \qquad (4)$$

Equations—Reference

In the body,

```
\begin{equation}
\mathbf{F} =-G\frac{m_1 m_2}{r^2}\hat{\mathbf{r}}.\label{eq:grav_force}
\end{equation}
Dividing both sides of \eqref{eq:grav_force} by $m_1$ we obtain the
gravitational field due to $m_2$.
```

we get

$$\mathbf{F} = -G\frac{m_1 m_2}{r^2}\hat{\mathbf{r}}. \qquad (1)$$

Dividing both sides of (1) by m_1 we obtain the gravitational field due to m_2.

Outline

Vector Image and Raster Image
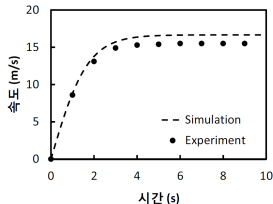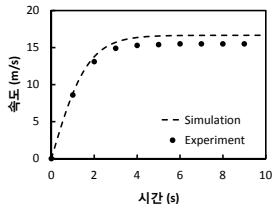
- **PDF**
- PS
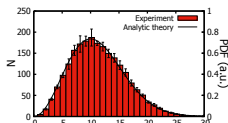- EPS

- **PNG**
- JPEG

Import an Image File

You should have a figure file above all. If the path of the figure file is, e.g., './figures/graph.pdf', write following in the preamble,

```
\usepackage{graphicx}
```

and in the body,

```
\includegraphics[width=0.5\textwidth]{./figures/graph.pdf}
```

we get

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Figure Environment

In the body,

```latex
\begin{figure}[t]
\centering
\includegraphics[width=0.5\textwidth]{./figures/graph.pdf}
\caption{Number of beads in every tubes spaced at regular intervals.}
\label{fig:result01}
\end{figure}
```
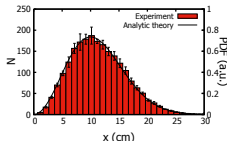
we get

Figure 1: Number of beads in every tubes spaced at regular intervals.

Figure Environment

The option of the figure environment specifies the placement.

- **h** Place the float *here*.
- **t** Position at the *top* of the page.
- **b** Position at the *bottom* of the page.
- **p** Put on a special *page* for floats only.

```
\usepackage[labelsep=period,labelfont=bf]{caption}
```

makes Figure 1: → **Figure 1.**

```
\renewcommand{\figurename}{Fig}
```

makes **Fig 1.**

In the next time ...

- **Table**
- **Itemization**
- **Citation**
- **Header and Footer**
- **Document Class**
- **Beamer**

Expert

- **TikZ**
  - Basic: 2D drawing
  - sub-packages: circuitikz, tikz-3dplot