Introduction to LaTeX

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Outline

- Tables
- Figures
- Beamer Template
- Useful Tips

Tables

How to make table?

```
\begin{table}[ht]
  \centering
  \begin{tabular}{ccc}        % alignment(c: center, l: left, r: right)
    \hline                    % horizontal line
    Var1 & Var2 & Var3 \\     % table elements(variable name + value)
    \hline
    1 & 2 & 3 \\
    4 & 5 & 6 \\
    7 & 8 & 9 \\
    \hline
  \end{tabular}
  \caption{Table example}     % caption
\end{table}
```

Listing 1: Table example code

How to make table?

Var1	Var2	Var3
1	2	3
4	5	6
7	8	9

Table 1: Table example

Multiple columns and rows

▷ Multiple rows

```
\usepackage{multirow}

\begin{table}[ht]
  \centering
  \begin{tabular}{ccc}
    \hline
    Var1 & Var2 & Var3 \\
    \hline
    \multirow{2}{4em}{multi row} & 3 \\
      & 5 & 6 \\
    7 & 8 & 9 \\
    \hline
  \end{tabular}
\end{table}
```

▷ Multiple columns

```
\begin{table}[ht]
  \centering
  \begin{tabular}{ccc}
    \hline
    Var1 & Var2 & Var3 \\
    \hline
    1 & 2 & 3 \\
    4 & 5 & 6 \\
    7 & 8 & 9 \\
    \hline
  \end{tabular}
\end{table}
```

Multiple columns and rows

- Multiple rows

Var1	Var2	Var3
multi row	2	3
	5	6
7	8	9

- Multiple columns

Var1	Var2	Var3
1	multi col	
4	5	6
7	8	9

Tables Generator

- GUI 형태로 값을 입력하는 방식
- 입력된 테이블을 LaTeX 코드로 변환해줌
- Table Generator

Tables Generator

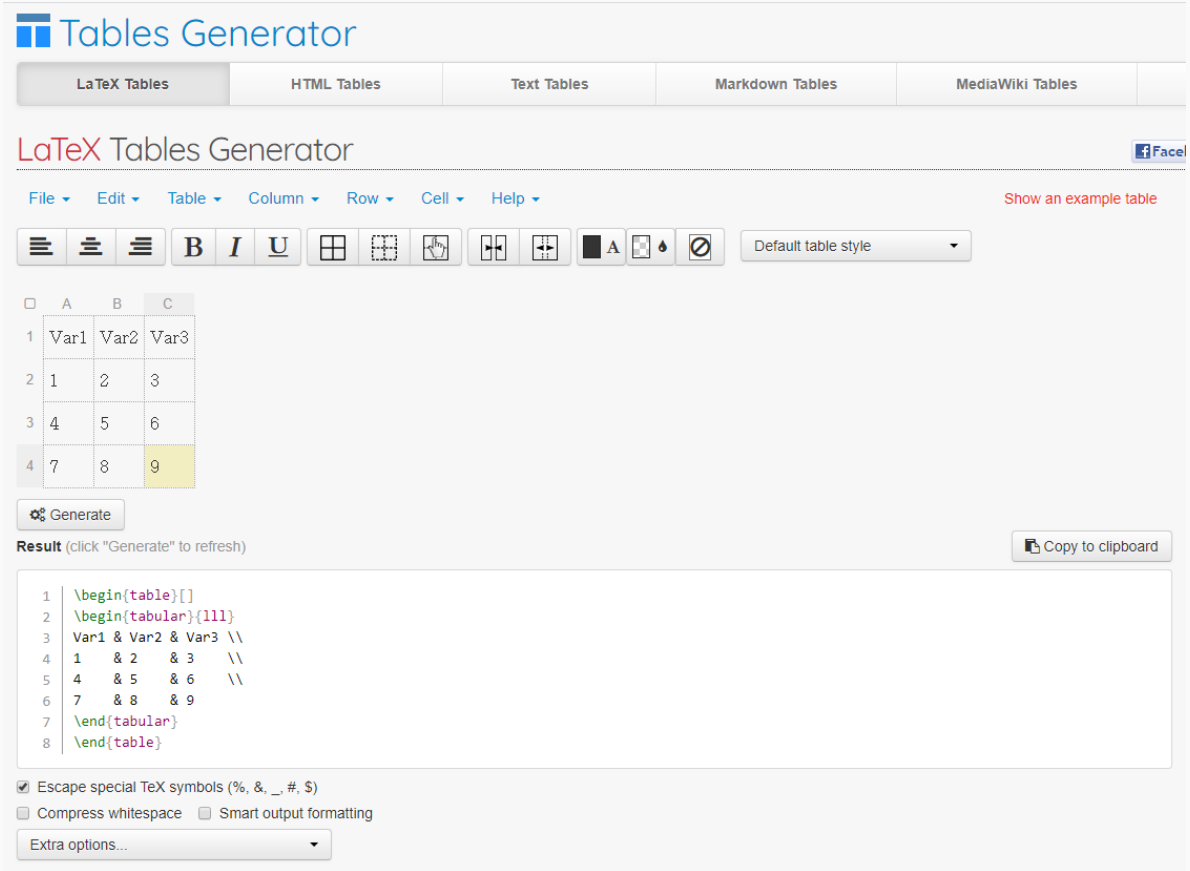

Figure 1: Example table using Table Generator

`xtable` package

- R의 `dataframe` or `matrix` type을 LaTeX 코드로 변환시켜주는 package
- "`xtable(df)`" 형식으로 사용
- LaTeX 코드가 반환

```
> head(iris)
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4         0.2  setosa
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
5          5.0         3.6          1.4         0.2  setosa
6          5.4         3.9          1.7         0.4  setosa
```

Figure 2: The sample dataframe object

`xtable` package

```
> library(xtable)
> xtable( head(iris) )
% latex table generated in R 3.6.1 by xtable 1.8-4 package
% Fri Jan 31 18:20:12 2020
\begin{table}[ht]
\centering
\begin{tabular}{rrrrrl}
  \hline
 & Sepal.Length & Sepal.Width & Petal.Length & Petal.Width & Species \\
  \hline
1 & 5.10 & 3.50 & 1.40 & 0.20 & setosa \\
  2 & 4.90 & 3.00 & 1.40 & 0.20 & setosa \\
  3 & 4.70 & 3.20 & 1.30 & 0.20 & setosa \\
  4 & 4.60 & 3.10 & 1.50 & 0.20 & setosa \\
  5 & 5.00 & 3.60 & 1.40 & 0.20 & setosa \\
  6 & 5.40 & 3.90 & 1.70 & 0.40 & setosa \\
   \hline
\end{tabular}
\end{table}
```

Figure 3: Output of `xtable` function

`xtable` package

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
1	5.10	3.50	1.40	0.20	setosa
2	4.90	3.00	1.40	0.20	setosa
3	4.70	3.20	1.30	0.20	setosa
4	4.60	3.10	1.50	0.20	setosa
5	5.00	3.60	1.40	0.20	setosa
6	5.40	3.90	1.70	0.40	setosa

Table 2: The table using output of `xtable` function

Figures

How to input figures?

```
\begin{figure}[h]   % t: top, b: bottom, h: here
  \begin{center}
    \includegraphics[width=0.7\linewidth]{img/figure.png}
  \end{center}
  \caption{Figure example}   % caption
  \label{fig:long}
  \label{fig:onecol}
\end{figure}
```

Listing 2: Figure example code

How to input figures?

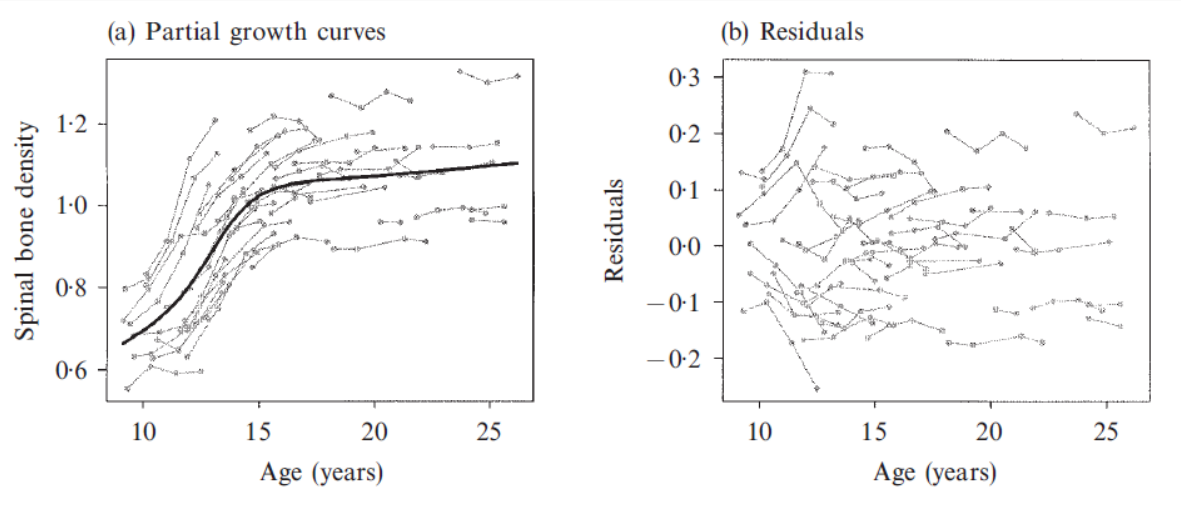

Figure 4: Figure example

Beamer Template

What is Beamer?

- 발표자료 형태의 LaTeX 문서
- 각 슬라이드에 내용을 넣는 방식으로 구성됨
- theme, color에 따라 다양한 양식 존재
- Beamer theme matrix

What is Beamer?

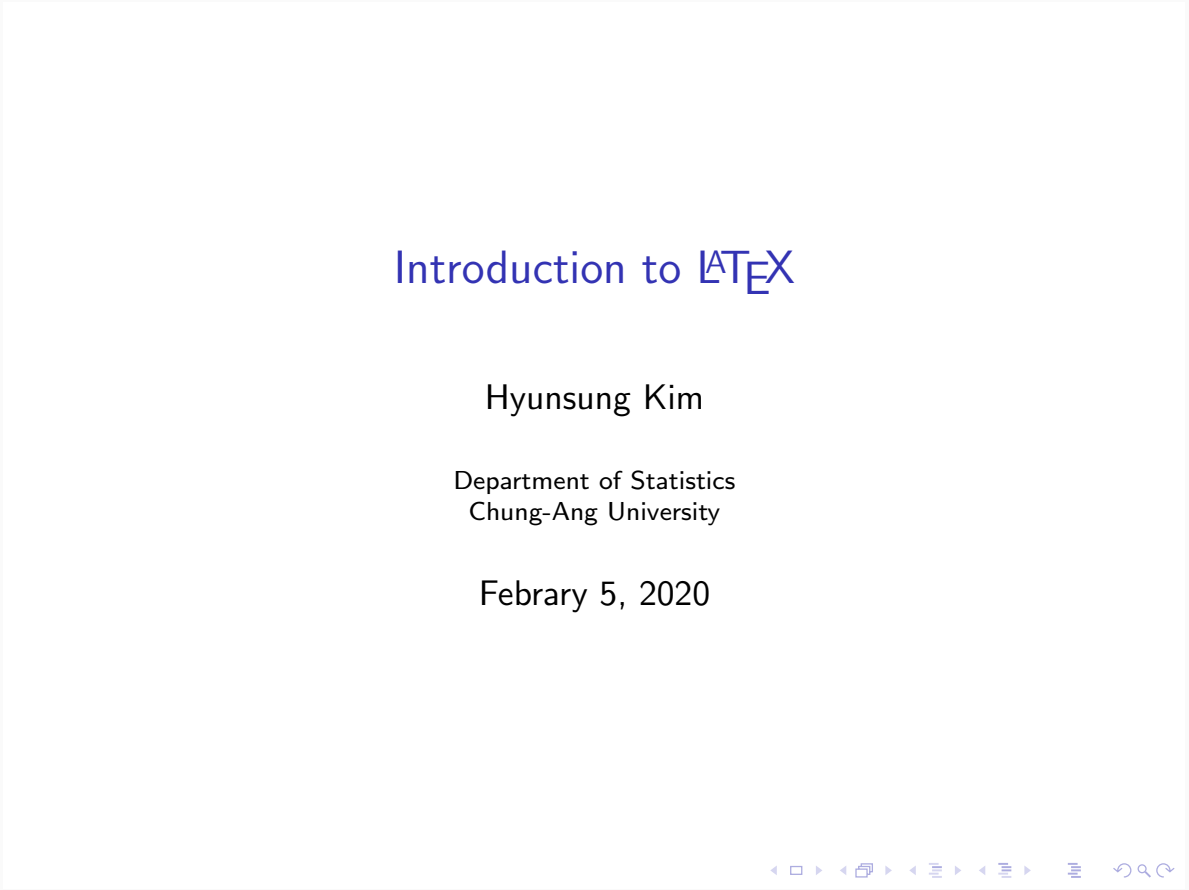

Figure 5: Beamer example

What is Beamer?

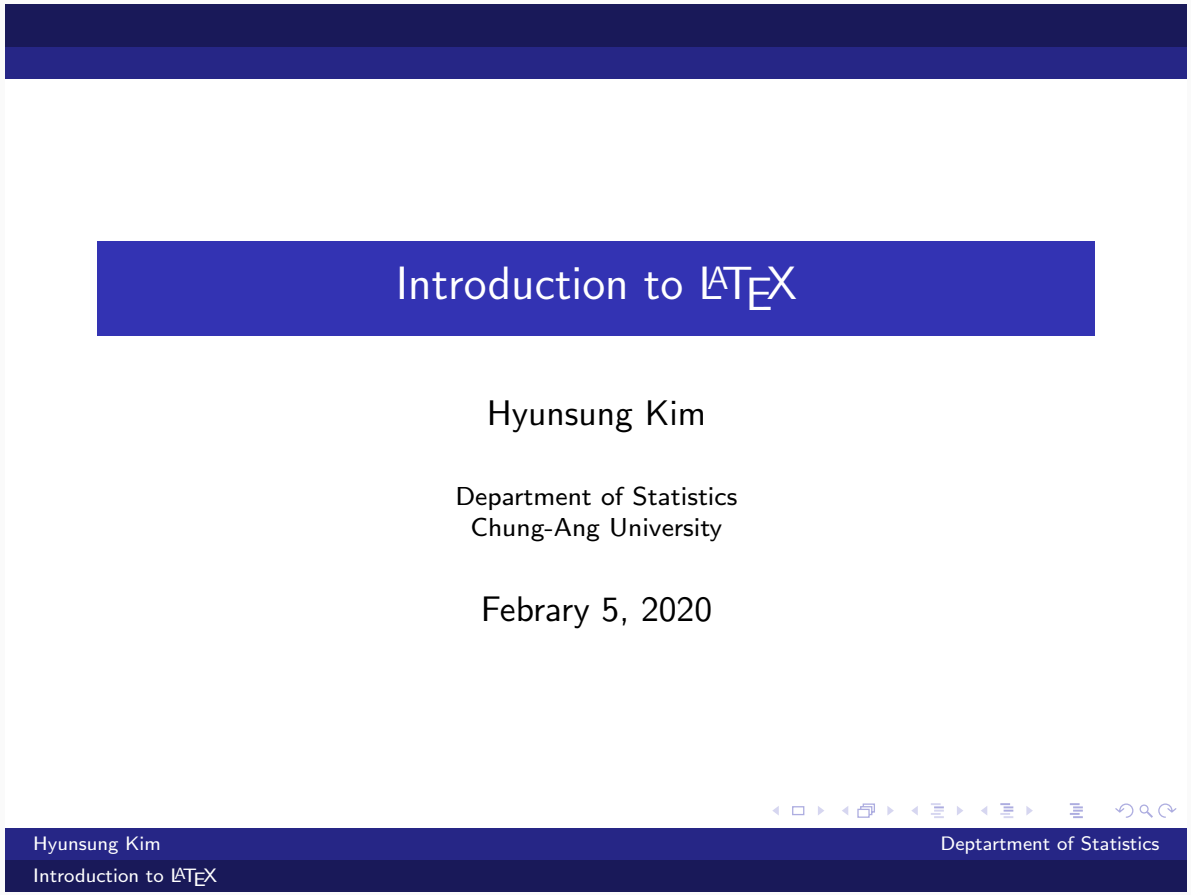

Figure 6: `Berlin` theme

What is Beamer?

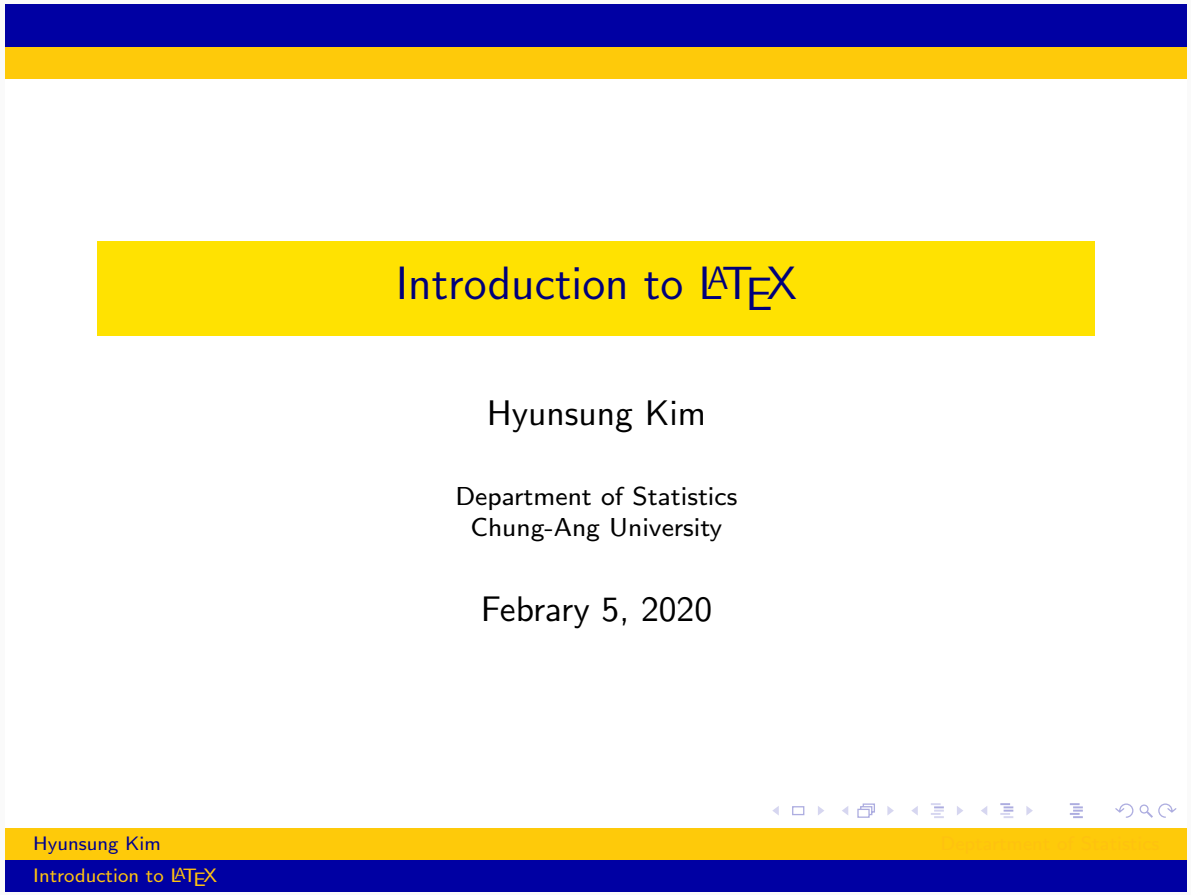

Figure 7: `Berlin` theme + `wolverine` colortheme

Example Code - Title

```
\documentclass{beamer}       % document type

\usetheme{Berlin}            % theme
\usecolortheme{wolverine}    % color theme

\title{Introduction to \LaTeX}
\date[Short Occasion]{Febrary 5, 2020}
\author{Hyunsung Kim}
\institute[Deptartment of Statistics]
{Department of Statistics\\ Chung-Ang University}
\subject{Introduction to \LaTeX}

% create slides here
\begin{document}

  % main title
  \begin{frame}
    \titlepage
  \end{frame}

\end{document}
```

Listing 3: Title code

Example Code - Slides

```
\begin{document}

  \section{Section 1}

  \subsection{Subsection 1}

  % slide 1
  \begin{frame}{Frame 1}
    \begin{itemize}
      \item {
        item 1
      }
      \item {
        item 2
      }
    \end{itemize}
  \end{frame}

\end{document}
```

Listing 4: Slides code

Example Code - Slides

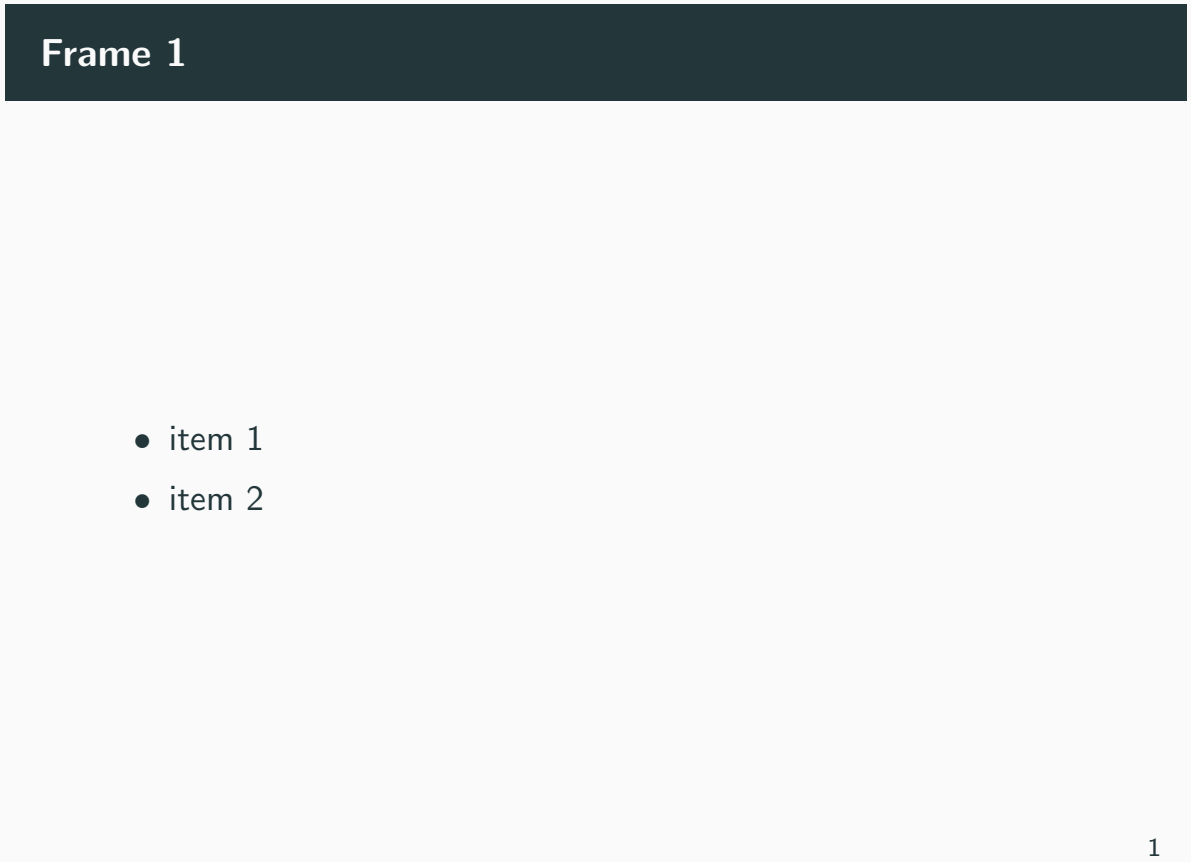

Figure 8: Slides example

Useful Tips

User defined command

- 수식 작성시 반복해서 사용하게 되는 코드가 생김(bold체 등)
- LaTeX 파일 상단에 축약해놓은 명령어를 지정해 놓고 사용하면 매우 편리!

Difference of codes

$$\mathbf{B}_i\boldsymbol{\Theta}\mathbf{D}\boldsymbol{\Theta}^T\mathbf{B}_i^T$$

▷ Original code

```
$$
\mathbf{B}_i \boldsymbol{\Theta} \mathbf{D} \boldsymbol{\Theta}^T \mathbf{B}_i^T
$$
```

▷ User defined code

```
$$
\bB_i \bTheta \bD \bTheta^T \bB^T_i
$$
```

User defined command

▷ 다음과 같이 정의하여 사용하면 됨

```
\def \bY { \mathbf{Y} }
\def \bB { \mathbf{B} }
\def \bI { \mathbf{I} }
\def \bD { \mathbf{D} }
\def \bbeta { \boldsymbol{\beta} }
\def \btheta { \boldsymbol{\theta} }
\def \bTheta { \boldsymbol{\Theta} }
\def \balpha { \boldsymbol{\alpha} }
```

Code block

- 코드를 같이 제출하는 과제가 있는 강의를 들을 때 유용 (통계계산론, 데이터마이닝 등)
- 단순 코드 복붙보다 깔끔하게 정리 가능
- 코드를 LaTeX 파일에 직접 넣지 않고 코드 파일을 첨부하여 사용 가능
- Reference

Build directory

- LaTeX 파일 compile시, pdf 뿐만 아니라 다른 파일들이 같이 생김
- 임시 파일들이 따로 폴더에 들어가도록 설정할 수 있음
- TeXstudio + Miktex 기준의 설정 방법
- PdfLaTeX의 명령어를 다음과 같이 수정하여 설정 가능

```
pdflatex.exe -synctex=0 -interaction=nonstopmode
--aux-directory=build %.tex
```

How to config Build directory?

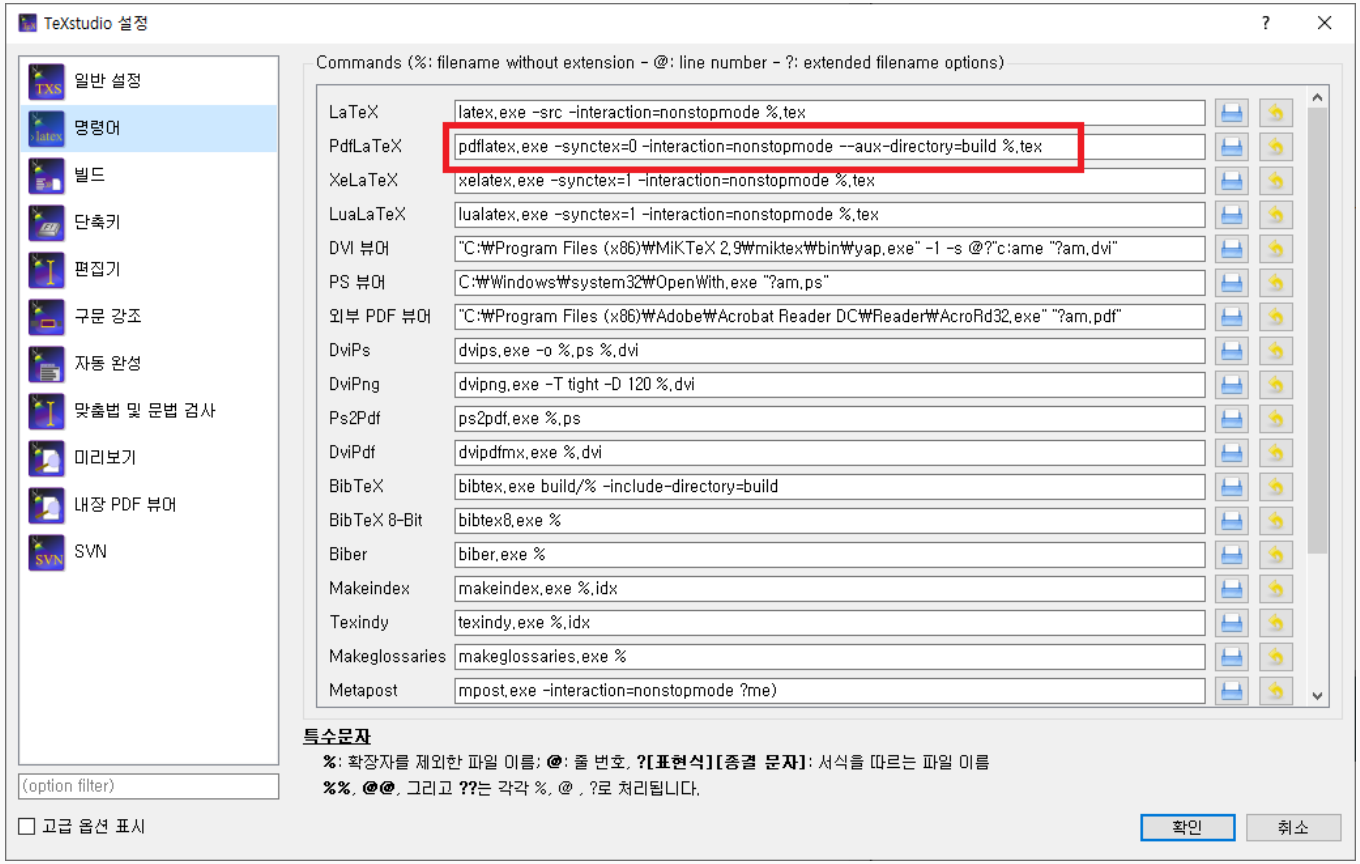

Figure 9: Settings in texstudio

Before configuration

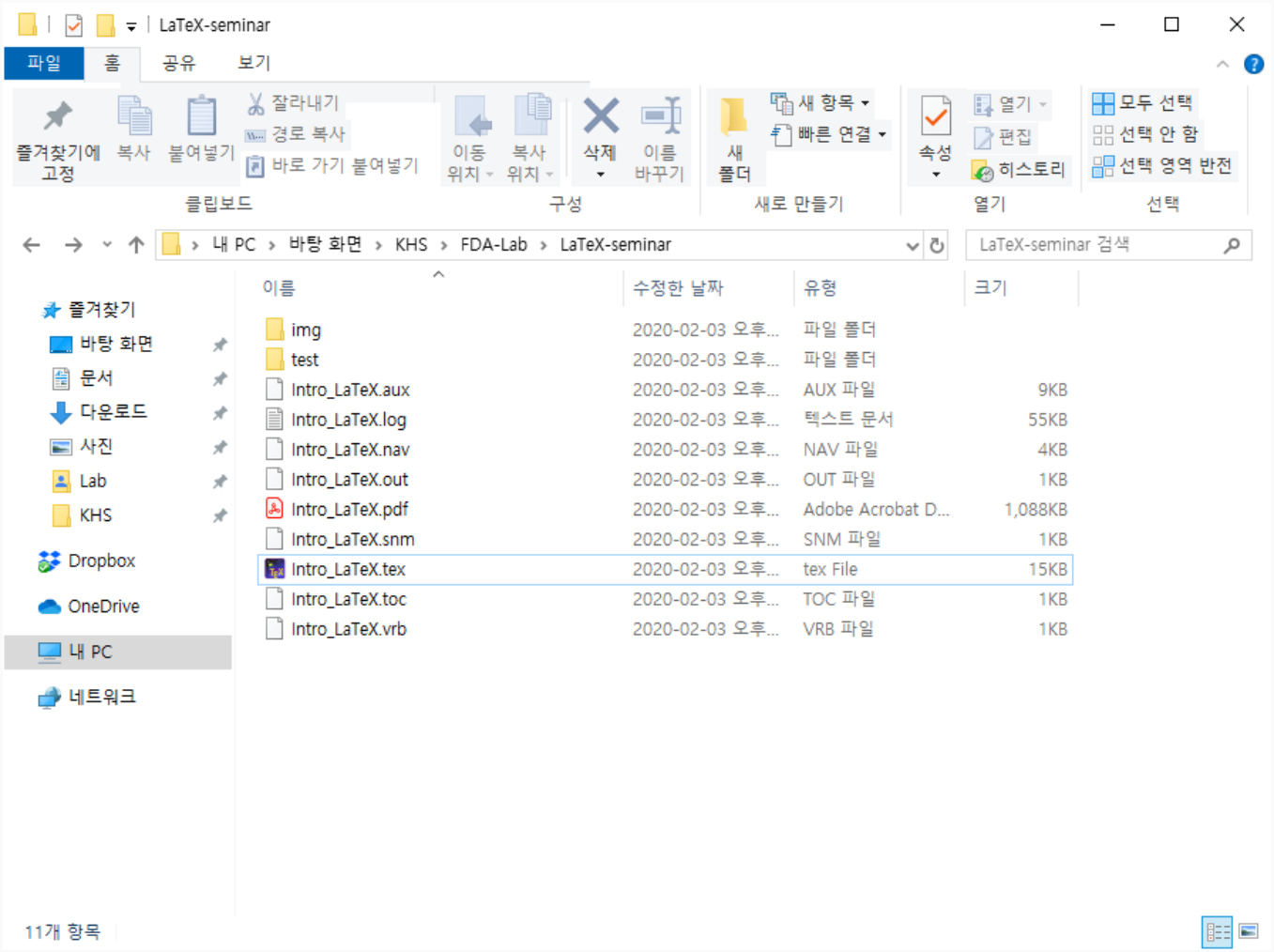

Figure 10: Before configuration

After configuration

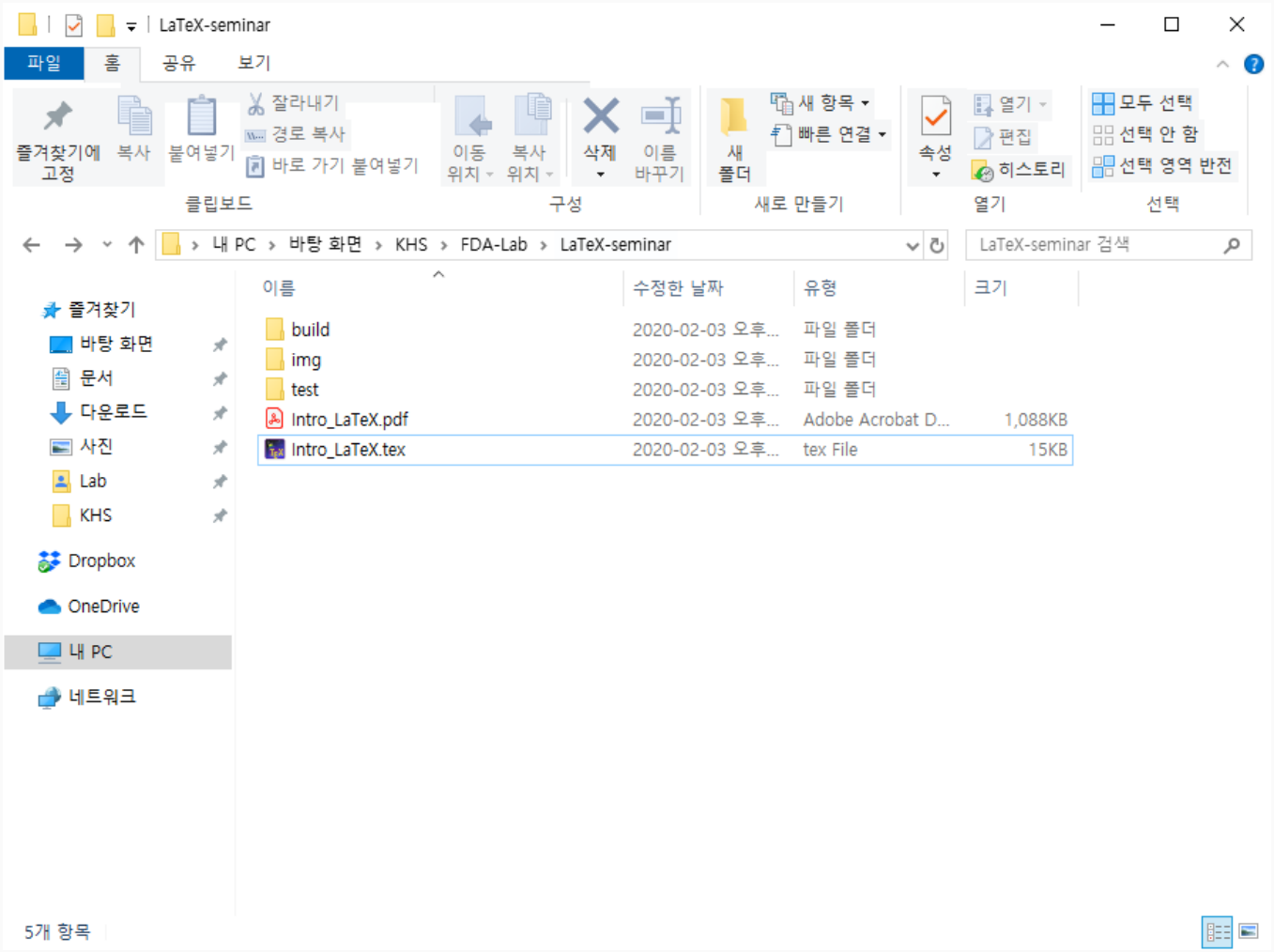

Figure 11: After configuration

Rmarkdown to Beamer

- `Rmarkdown`으로 LaTeX 문서 작성 가능
  (단, LaTeX 설치되어 있는 경우만 가능)
- `Markdown` 문법 + LaTeX 혼용 가능
- Reference

감사합니다!