Guide for `thesisdtetiugm` Class File

Equations in LaTeX

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Introduction

What is LaTeX?

- One of the strengths of using LaTeX compared to other editors is its excellent support for writing equations.

Environments

Various Environments for Equations

There are several environments in LaTeX that you can use to typeset equations. Here are some commonly used ones:

- inline equation: You can typeset equations inline within the text by enclosing them in single dollar signs (`$`).
- `equation` environment: The `equation` environment is used for displaying standalone, single equation. It automatically numbers the equations and places them in the center of the line.
- `align` environment: The `align` environment is used to typeset multiline equations alignment at ampersands (`&`).
- `align*` environment: The `align*` environment is `align` environment but does not automatically number the equations.

Inline Equation

Inline equation is used when you want to mention equation or variable inside of sentence. For example, this equation of $E = mc^2$ is written using `$E=mc^2$`.

`equation` Environment

(1) called using `\ref{eq:eq1}`.

```
\begin{equation}
  \label{eq:eq1}
    x = 2x + 3
\end{equation}
```

$$x = 2x + 3 \tag{1}$$

`align` Environment

(2–4) called using `(\ref{eq:eq2}\textendash\ref{eq:eq4})`.

```
\begin{align}
  x &= 2x + 3 \label{eq:eq2} \\
  x - 2x &= 3 \label{eq:eq3} \\
  x &= 1 \label{eq:eq4}
\end{align}
```

$$x = 2x + 3 \tag{2}$$

$$x - 2x = 3 \tag{3}$$

$$x = 1 \tag{4}$$

`align*` Environment

Just like `align` but default to no numbering.

```
\begin{align*}
  x &= 2x + 3 \\
  x - 2x &= 3 \\
  x &= 1
\end{align}
```

$$
\begin{aligned}
x &= 2x + 3 \\
x - 2x &= 3 \\
x &= 1
\end{aligned}
$$

Equation Cotrol and Commands

- `\notag` to not add euqation numbering on current line of `align` environment. This is the recommended way.
- `\tag{\stepcounter{equation}\theequation}` to add euqation numbering in `align*` environment.

Example Equation using `align` environment and `\notag` #1

```
\begin{align}
  f(x+h)           &= f(x)
                    + f^\prime(x)h
                    + \mathcal{O}(h^{2}) \notag \\
  f^\prime(x)h     &= f(x+h)
                    - f(x)
                    + \mathcal{O}(h^{2}) \notag \\
  f^\prime(x)      &= \frac{f(x+h) - f(x)}{h}
                    + \mathcal{O}(h)
\end{align}
```

Example Equation using `align` environment and `\notag` #2

$$
\begin{aligned}
f(x+h) &= f(x) + f'(x)h + \mathcal{O}(h^2) \\
-f'(x)h &= -f(x+h) + f(x) + \mathcal{O}(h^2) \\
f'(x) &= \frac{f(x+h) - f(x)}{h} + \mathcal{O}(h) \qquad (5)
\end{aligned}
$$