1 LaTeX Sample File

1.1 Examples of LaTeX code

- Note that Greek letters are considered math symbols and so they, any any actual mathematics, need to be enclosed in dollar signs. This tells LaTeX that it needs to switch to "mathematics" mode.

- Here is the letter "alpha", α, using the builtin command

  ```
  ``\alpha''
  ```

- Here is the letter "alpha", α using our personalized quick alpha

  ```
  ``\qa''
  ```

- Here is a vector, $\vec{x}$ using the builtin command

  ```
  \vec{x}
  ```

- Here is a vector, $\overrightarrow{x}$, using the 'fancy vector' command

  ```
  \fancyvec{x}.
  ```

  Note the arrows are different.

- Using 'Fancy' as a parameter in the fancy vector command

  ```
  \fancyvec{Fancy}
  ```

  yields $\overrightarrow{Fancy}$.

- Matrices the long way:

  ```
   \[ M = {\left[ \begin{array}{cc}
  x & y \\
  z & w \\
  \end{array}
     \right]} \]
  ```

  produces

  $$M = \left[\begin{array}{cc} x & y \\ z & w \end{array} \right]$$

- Since we have

```
\usepackage{amsmath}
```

right after our

```
\documentclass ...
```

statement in the header, then we can simplify writing matrices by using the amsmath command

```
$ \begin{bmatrix} x & y & a \\ z & w & b \end{bmatrix}$
```

which produces $\begin{bmatrix} x & y & a \\ z & w & b \end{bmatrix}$

- Another example of LaTeX code is:

```
 Suppose $A$ is an $m\times
n$ matrix with columns $A_{1},A_{2},A_{3},...,A_{n}$ and $\vec{u}$ is a
vector of size $n$. Then the matrix-vector product of $A$ with
$\vec{u}$ is the linear combination
$A\vec{u}=[u]_{1}A_{1}+[u]_{2}A_{2}+[u]_{3}A_{3}+ \cdots +[u]_{n}A_{n}$
```

This produces

Suppose A is an $m\times n$ matrix with columns $A_{1},A_{2},A_{3},...,A_{n}$ and $\vec{u}$ is a vector of size n. Then the matrix-vector product of A with $\vec{u}$ is the linear combination $A\vec{u}=[u]_{1}A_{1}+[u]_{2}A_{2}+[u]_{3}A_{3}+ \cdots +[u]_{n}A_{n}$

- Here is an example of a complex superscript-subscript structure.

```
$$  \left( M_{A_{3}}\right)^{2} $$
```

This produces

$$\left(M_{A_{3}}\right)^{2}$$

1.2 Example Definition Environment

Definition 1 *Suppose A is an $m\times n$ matrix with columns $A_{1},A_{2},A_{3},...,A_{n}$ and $\vec{u}$ is a vector of size n. Then the matrix-vector product of A with $\vec{u}$ is the linear combination $A\vec{u}=[u]_{1}A_{1}+[u]_{2}A_{2}+[u]_{3}A_{3}+ \cdots +[u]_{n}A_{n}$*

is produced by

```
\begin{defn}
Suppose $A$ is an $m\times
n$ matrix with columns $A_{1},A_{2},A_{3},...,A_{n}$ and $\vec{u}$ is a
vector of size $n$. Then the matrix-vector product of $A$ with
$\vec{u}$ is the linear combination
$A\vec{u}=[u]_{1}A_{1}+[u]_{2}A_{2}+[u]_{3}A_{3}+ \cdots +[u]_{n}A_{n}$

\end{defn}
```

1.3 Example of Theorem and Proof Environments

Theorem 1 *The additive identity of a vector space is unique.*

Proof Let $\vec{u}$ and $\vec{v}$ be additive identities in a vector space V. Then

$$\vec{u} = \vec{u} + \vec{v} = \vec{v}$$

■

is produced by

```
\begin{theorem}
The additive identity of a vector space is unique.

\end{theorem}

\begin{proof}
Let $\vec{u}$ and $\vec{v}$ be additive identities in a vector space V.
Then
$$ \vec{u}=\vec{u}+\vec{v}=\vec{v}$$

\end{proof}
```

Note that sections, subsections, definitions and theorems are all numbered automatically.

2 Problems with Floats

If you want to include figures or tables or such in a paper you can use the appropriate environment –e.g.,

```
\begin{figure} ... \end{figure}
```

However, LaTeX does not always place the figure or table where you want it to go because the size of the figure might be too large to allow it to fit on the current page. This problem is linked to what LaTeXcalls **floats**: objects that might have to be moved by LaTeX in order to typeset your paper. You can find pretty much everything you need to know about how LaTeX's default use of floats and how to tweak the settings to do what you want at `http://people.cs.uu.nl/piet/floats/index.html`