Matrices and Vectors

- Matrices in LaTeX:

$$\texttt{pmatrix:}\ \begin{pmatrix}1 & 2 & 3\\ 4 & 5 & 6\\ 7 & 8 & 9\end{pmatrix} \qquad \texttt{bmatrix:}\ \begin{bmatrix}1 & 2 & 3\\ 4 & 5 & 6\\ 7 & 8 & 9\end{bmatrix} \qquad \texttt{vmatrix:}\ \begin{vmatrix}1 & 2 & 3\\ 4 & 5 & 6\\ 7 & 8 & 9\end{vmatrix}$$

  LaTeXcode:

```
\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}
\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}
\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}
```

  Explanation:

  - `\begin{pmatrix}` starts a matrix with parenthesis
  - the & separates each column
  - the \\ ends each row
  - `\end{pmatrix}` ends the matrix

- Augmented matrices in LaTeX:

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{array}\right)$$

  LaTeXcode:

```
\left( \begin{array}{ccc|c} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{array} \right)
```

  Explanation:

  - `\left(` puts the left parenthesis,
  - `\begin{array}` starts an array (matrix),
  - {`ccc|c`} states that the array has four centered columns with a vertical bar between the third and fourth columns

- Vectors in LaTeX:
  - column vectors: build an $n \times 1$ matrix
  - row vectors: build a $1 \times n$ matrix

$$\begin{pmatrix}1 & 2 & 3 & 4\end{pmatrix} \qquad \begin{pmatrix}1\\ 2\\ 3\\ 4\end{pmatrix}$$

  LaTeXcode:

```
\begin{pmatrix} 1 & 2 & 3 & 4 \end{pmatrix}
\begin{pmatrix} 1 \\ 2 \\ 3 \\ 4 \end{pmatrix}
```