Assignment 7 - Code

\documentclass{article}

\usepackage{caption}

\usepackage{amsmath}

\usepackage{subcaption}% Required for inserting images

\title{\huge\textbf{Mathematical Components}}

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\date{\today}

\begin{document}

\maketitle

\section{Representation of Mathematical Components in Latex}

\subsection{Matrix formation in latex}

In LaTeX, matrices are easily created using the 'bmatrix' environment provided by the 'amsmath' package. Each row of the matrix is separated by $\backslash$$\backslash$, and elements within each row are separated by \&. You enclose the matrix within $\backslash$begin\{bmatrix\} and $\backslash$end \{bmatrix\} tags. Adjustments to the matrix size or style can be made by modifying the code accordingly.

\subsubsection{Matrix representation}

\[

A = \begin{bmatrix}

a\_{11} & a\_{12} & \cdots & a\_{1n} \\

a\_{21} & a\_{22} & \cdots & a\_{2n} \\

\vdots & \vdots & \ddots & \vdots \\

a\_{m1} & a\_{m2} & \cdots & a\_{mn}

\end{bmatrix}

\]

\subsubsection{Representing a 3x3 matrix with actual values}

\[

A = \begin{bmatrix}

1 & 2 & 3 \\

4 & 5 & 6 \\

7 & 8 & 9

\end{bmatrix}

\]

\subsubsection{Representing Determinants}

Let $A$ be a matrix:

\[

A = \begin{bmatrix}

a\_{11} & a\_{12} \\

a\_{21} & a\_{22}

\end{bmatrix}

\]

The determinant of matrix $A$, denoted as $|A|$, is calculated as:

\[

|A| = \begin{vmatrix}

a\_{11} & a\_{12} \\

a\_{21} & a\_{22}

\end{vmatrix} = a\_{11} \cdot a\_{22} - a\_{12} \cdot a\_{21}

\]

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\subsection{Mathematical integrals in latex}

\subsubsection{Single Integrals}

Integral expression can be added using the $\backslash$int\\_\{lower\}\^\{upper\} command.

\[ I = \int\_{a}^{b} x^2 \,dx \]

\subsubsection{Multiple Integrals}

To obtain double/triple/multiple integrals and cyclic integrals you must use 'amsmath' and 'esint' (for cyclic integrals) packages.

\begin{gather}

A = \iint\_V \mu(u,v) \,du\,dv \\ \\

B = \iiint\_V \mu(u,v,w) \,du\,dv\,dw \\ \\

C = \iiiint\_V \mu(t,u,v,w) \,dt\,du\,dv\,dw \\ \\

D = \idotsint\_V \mu(u\_1,\dots,u\_k) \,du\_1 \dots du\_k

\end{gather}

\subsubsection{Circular Integral}

\[

I = \oint\_V f(s) \,ds

\]

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\subsection{Fractions and binomials in latex}

\subsubsection{Representing Fractions}

Fractions represent a part of a whole or a division of two numbers:

\[

\frac{6}{17}

\]

\subsubsection{Representation of Binomial coefficient}

The binomial coefficient is represented as:

\[

\binom{n}{k}

\]

\subsubsection{Binomial coefficient expression}

The binomial coefficient, \(\binom{n}{k}\), is defined by the expression:

\[

\binom{n}{k} = \frac{n!}{k!(n-k)!}

\]

\end{document}