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}

\]

\newpage

\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}
\[
    I = \oint_V f(s) \,ds
\]
```

```
\newpage
```

```
\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}
```