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```
\documentclass{beamer}
\usepackage[utf8]{inputenc}
\title{Assignment - 2}
\author{Kritika Mudgil \\College Roll No.- MAT/20/101 \\ University Roll No. - 20044563026}
\institute{Mata Sundri College for Women \\ University of Delhi}
\date{}
\usepackage{gensymb}
\usepackage{xcolor}
\usepackage{graphicx}
\usetheme{Berlin}
\begin{document}
\begin{frame}
    \titlepage
\end{frame}
\begin{itemize}
\begin{frame}{Content on Page No.69}

        \item Let $\mathbf{x} =(x_1,\dots,x_n)$,where the $x_i$ are non negative real numbers.Set
        \[
        M_r(\mathbf{x}) = \left(\frac{x_1^r+x_2^r+ \dots+x_n^r}{n}\right)^{1/r},\; \; r \in \mathbf{R} \setminus \{0\},
        \]
        and
        \[
        M_0(\mathbf{x})=\left(x_1 x_2 \dots x_n \right)^{1/n}.
        \]
        We call $M_r(\mathbf{x})$ the \emph{$r$th power mean} of $\mathbf{x}$.

        Claim:
        \[
        \lim_{r \rightarrow 0} M_r(\mathbf{x}) = M_0(\mathbf{x}).
        \]

        \end{frame}
```

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```
    \]

    \end{frame}
    \begin{frame}{Content on Page No.69}
    \item Define
    \[
    V_n=
    \left[
    \begin{array}{ccccc}
    1 & 1 & 1 & \cdots & 1\\
    x_1 & x_2 & x_3 & \cdots & x_n\\
    x_1^2 & x_2^2 & x_3^2 & \cdots & x_n^2\\
    \vdots & \vdots & \vdots & \ddots & \vdots\\
    x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \cdots & x_n^{n-1}
    \end{array}
    \right]
    \]
    We call $V_n$ the \emph{Vandermonde matrix} of order $n$.

    Claim:
    \[
    \det V_n = \prod_{1 \leq i < j \leq n}(x_j-x_i).
    \]
\end{frame}
 \end{itemize}
 \begin{enumerate}
 \begin{frame}{Question No.4}
    \item $$3^3 +4^3 + 5^3 =6^3$$
    \item $$\sqrt{100} = 10$$
    \item $$(a + b)^3 = a^3 +3a^2b +3ab^2 +b^3$$
    \item $$\sum_{k=1}^n k= \frac{n(n +2)}{2}$$
    \item \begin{eqnarray*}
    \frac{\pi}{4}= \frac{1}{1}-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-\frac{1}{11}+\cdots
```

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```
    \frac{\pi}{4}= \frac{1}{1}-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-\frac{1}{11}+\cdots
     \end{eqnarray*}
     \end{frame}
     \begin{frame}{Remaining parts of Question No. 4}

    \item $$\cos\theta = \sin(90\degree-\theta)$$
    \item $$e^{i\theta}= \cos\theta +i \sin\theta$$
    \item $$\lim_{\theta\rightarrow {0}}\frac{\sin\theta}{\theta} = 1$$
    \item $$\lim_{x\rightarrow\infty}\frac{\pi(x)}{\frac{x}{log x}} = 1$$
    \item $$ \int_{-\infty}^{\infty}e^{-x^2}dx = \sqrt{\pi}$$
  \end{frame}
  \end{enumerate}
  \begin{itemize}
\begin{frame}{Question No.5}
    \item Positive numbers $a$ , $b$ and $c$ are the side lengths of a triangle if and only if $a + b >c$ , $b + c> a$ , and $c + a > b$.
    \item The area of a triangle with side lengths $a$ ,$b$ and $c$ is given by \emph{Heron's formula}:\\
    $$A =\sqrt{s(s-a)(s-b)(s-c)},$$
    where $s$ is the semiperimeter $(a+b+c)/2.$
    \item The volume of a regular tetrahedron of edge length 1 is ${\sqrt{2}}/12$.
     \end{frame}
     \begin{frame}{Remaining parts of Question No. 5}
    \item The quadratic equation $ax^{2} + bx + c =0$ has roots\\
    $$r_1,r_2 = \frac{-b\pm\sqrt{b^{2} - 4ac}}{2a}.$$
    \item The \emph{derivative} of a function \emph{f} , denoted \emph{f'} , is defined by \\
    $$f'(x) =\lim_{h\rightarrow{0}}\frac{f(x + h) - f(x)}{h}$$.
      \end{frame}
      \begin{frame}{Remaining parts of Question No.5}
    \item A real - valued function \emph{f} is \emph{convex} on an interval I if\\
    $$ f(\lambda x + (1 - \lambda)y)\leq\lambda f(x) + (1 - \lambda)f(y),$$
    for all $x, y\in I$ and $0\leq \lambda \leq 1$
     \item The general solution to the differential eqaution\\
     $$y" - 3 y' + 2y = 0$$
```

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```
     \item The general solution to the differential eqaution\\
     $$y" - 3 y' + 2y = 0$$
     is
     $$y= C_1e^x + C_2e^{2x}$$
     \item The \emph{Fermat number} $F_n$ is defined as\\
     $$F_n= 2^{2^{n}} ,  n\leq0.$$
     \end{frame}
\end{itemize}
\begin{itemize}
\begin{frame}{Question No.6}
   \item $$\frac{d}{dx}\left(\frac{x}{x+1}\right)=\frac{1}{(x+1)^2}$$
   \item $$\lim_{n\rightarrow\infty}\left(1+\frac{1}{n}\right)^n =e$$
   \item $$\left|
   \begin{array}{cc}
   a & b\\
   c & d
   \end{array}
   \right|
   =ad - bc$$
   \item $$\mathcal{R}_\theta=\left[
   \begin{array}{cc}
   \cos\theta & -\sin\theta \\
   \sin\theta & \cos\theta
   \end{array}
   \right]$$
\end{frame}
\begin{frame}{Remaining parts of Question No.6}
    \item $$\left|
    \begin{array}{ccc}
    \textbf{i} & \textbf{j} & \textbf{k}\\
    a_1 & a_2 & a_3 \\
    b_1 & b_2 & b_3
```

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```
\begin{array}{ccc}
\textbf{i} & \textbf{j} & \textbf{k}\\
a_1 & a_2 & a_3 \\
b_1 & b_2 & b_3
\end{array}
\right| = \left|
\begin{array}{cc}
a_2 & a_3\\
b_2 & b_3
\end{array}
\right| \textbf{i} - \left|
\begin{array}{cc}
   a_1  &  a_3\\
    b_1 & b_3
\end{array}
\right| \textbf{j} + \left|
\begin{array}{cc}
a_1 & a_2\\
b_1 & b_2
\end{array}
\right| \textbf{k}$$
\item $$\left[
\begin{array}{cc}
   a_{11} &  a_{12}\\
   a_{21}  &  a_{22}
\end{array}
\right] \left[
\begin{array}{cc}
b_{11} &  b_{12}\\
b_{21}  & b_{22}
\end{array}
\right] = \left[
\begin{array}{cc}
```

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```
   \right] = \left[
   \begin{array}{cc}
  a_{11}b_{11} + a_{12}b_{21}      &  a_{11}b_{12} + a_{12}b_{22}\\
   a_{21}b_{11} + a_{22}b_{21}     &  a_{21}b_{12} + a_{22}b_{22}
   \end{array}
   \right]$$
 \end{frame}
 \begin{frame}{Remaining parts of Question No.6}
    \item $${f(x)} =\left\{
    \begin{array}{ll}
      -x^2&,x>0 \\
       x^2&,0\leq x \leq 2\\
       4&,x>2
    \end{array}
    \right.$$
    \end{frame}
    \end{itemize}
    \begin{frame}{Multi-Line Equations}
        \begin{block}{(i) part of Question No.7}
        \end{block}
        \begin{eqnarray*}
      1+2 & = & 3\\
       4+5+6 & = & 7+8\\
       9+10+11+12 & = & 13+14+15\\
       16+17+18+19+20 & = & 21+22+23+24\\
       25+26+27+28+29+30 & = & 31+32+33+34+35
       \end{eqnarray*}
\end{frame}
        \begin{frame}{Multi-Line Equations}
        \begin{block}{(ii) part of Question No.7}
        \end{block}

        \begin{eqnarray*}
```

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```
	\begin{eqnarray*}
	(a+b)^2 & = & (a+b)(a+b)\\
	        & = & (a+b)a+(a+b)b\\
	        & = & a(a+b)+b(a+b)\\
	        & = & a^2 + ab +ba +b^2\\
	        & = & a^2 +ab + ab + b^2\\
	        & = & a^2 +2ab + b^2
	\end{eqnarray*}
\end{frame}
\begin{frame}{Multi-Line Equations}
\begin{block}{(iii) part of Question No.7}
	\end{block}
	\begin{eqnarray*}
	\tan(\alpha+\beta+\gamma) & = & \frac{\tan(\alpha+\beta)+\tan\gamma}{1-\tan(\alpha+\beta)\tan\gamma}\\
	& = & \frac{\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}+\tan\gamma}{1-(\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta})\tan\gamma}\\
	& = & \frac{\tan\alpha+\tan\beta+(1-\tan\alpha\tan\beta)\tan\gamma}{1-\tan\alpha\tan\beta-(\tan\alpha+\tan\beta)\tan\gamma}\\
	& = & \frac{\tan\alpha+\tan\beta+\tan\gamma-\tan\alpha\tan\beta\tan\gamma}{1-\tan\alpha\tan\beta-\tan\alpha\tan\gamma-\tan\beta\tan\gamma}
	 \end{eqnarray*}

	 \end{frame}
	 \begin{frame}{Multi-Line Equations}
	 \begin{block}{(iv) part of Question No.7}
	\end{block}

	\begin{eqnarray*}
	\prod_{p}(1-\frac{1}{p^2}) & =& \prod_p\frac{1}{1+\frac{1}{p^2}+\frac{1}{p^4}+\dots}\\
	& = & \left(\prod_p\left(1+\frac{1}{p^2}+\frac{1}{p^4}+\dots\right)\right)^{-1}\\
	& = & \left(1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\dots\right)^{-1}\\
	& = & \frac{6}{\pi^{2}}
	\end{eqnarray*}
	\end{frame}
```

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```
                    & = & a^2 +2ab + b^2
          \end{eqnarray*}
\end{frame}
\begin{frame}{Multi-Line Equations}
\begin{block}{(iii) part of Question No.7}
          \end{block}
          \begin{eqnarray*}
          \tan(\alpha+\beta+\gamma) & = & \frac{\tan(\alpha+\beta)+\tan\gamma}{1-\tan(\alpha+\beta)\tan\gamma}\\
          & = & \frac{\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}+\tan\gamma}{1-(\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta})\tan\gamma}\\
          & = & \frac{\tan\alpha+\tan\beta+(1-\tan\alpha\tan\beta)\tan\gamma}{1-\tan\alpha\tan\beta-(\tan\alpha+\tan\beta)\tan\gamma}\\
          & = & \frac{\tan\alpha+\tan\beta+\tan\gamma-\tan\alpha\tan\beta\tan\gamma}{1-\tan\alpha\tan\beta-\tan\alpha\tan\gamma-\tan\beta\tan\gamma}
           \end{eqnarray*}


           \end{frame}
           \begin{frame}{Multi-Line Equations}
           \begin{block}{(iv) part of Question No.7}
          \end{block}

          \begin{eqnarray*}
          \prod_{p}(1-\frac{1}{p^2}) & =& \prod_p\frac{1}{1+\frac{1}{p^2}+\frac{1}{p^4}+\dots}\\
          & = & \left(\prod_p\left(1+\frac{1}{p^2}+\frac{1}{p^4}+\dots\right)\right)^{-1}\\
          & = & \left(1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\dots\right)^{-1}\\
          & = & \frac{6}{\pi^{2}}
          \end{eqnarray*}
          \end{frame}
          \begin{center}
          \includegraphics[angle=0,scale=0.16]{download 1.png}
          \end{center}

\end{document}

```