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File outline

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```

1 \documentclass[10pt]{beamer}
2 \usepackage[utf8]{inputenc}
3 \usepackage{mathtools}
4 \usepackage{Madrid}
5 \definecolor{aggiemaroon}{RGB}{0,0,80}
6 \usecolortheme[named=aggiemaroon]{structure}
7 \useoutertheme{split}
8 \title[Mata Sundri College for Women, University of
Delhi]{Document}
9 \author[Shreya Jain]{\Large \textit{Shreya Jain}\!\!
\vspace{0.2cm} \large {College Roll no.- MAT/20/91\!\!
University Roll no.- 20044563019}}
10 \institute{\includegraphics[scale=0.15]{College
logo.jpeg}\!\! [0.4cm]
11 {\large Mata Sundri College for Women, \!\! University of
Delhi}}
12 \date{}
13 \usepackage{graphicx}
14 \begin{document}
15 \begin{frame}
16 \titlepage
17 \end{frame}
18 \begin{frame}{Content of Page no. 69}
19 \begin{block}{}

```

Document

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- Let  $x = (x_1, \dots, x_n)$ , where the  $x_i$  are non-negative real numbers. Set
$$M_r(x) = \left( \frac{x_1^r + x_2^r + \dots + x_n^r}{n} \right)^{1/r}, \quad r \in \mathbb{R} \setminus \{0\},$$
and
$$M_0(x) = (x_1 x_2 \dots x_n)^{1/n}.$$
We call  $M_r(x)$  the  $r$ th power mean of  $x$ .  
Claim:  $\lim_{r \rightarrow 0} M_r(x) = M_0(x)$ .

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```

19 - \begin{block}{}
20 - \begin{itemize}
21 \item Let  $\mathbf{x}=(x_1, \dots, x_n)$ ,
22 where the  $x_i$  are non-negative real numbers.
23 Set
24  $M_r(\mathbf{x}) = \left(\frac{x_1^r+x_2^r}{n} + \dots + x_n^r\right)^{1/r}$ ,  $r \in \mathbb{R}$ 
25  $\setminus \{0\}$ ,
26 and
27  $M_0(\mathbf{x})=\left(x_1 x_2 \dots x_n\right)^{1/n}$ .
28 We call  $M_r(\mathbf{x})$  the  $r$ th power mean
29 of  $\mathbf{x}$ .
30 Claim:
31  $\lim_{r \rightarrow 0} M_r(\mathbf{x}) = M_0(\mathbf{x})$ .
32 \end{itemize}
33 \end{block}
34 \begin{frame}{Content of Page no. 69}
35 \begin{block}{}
36 \begin{itemize}
37 \item Define
38 
$$M_r(x) = \left(\frac{x_1^r + x_2^r + \dots + x_n^r}{n}\right)^{1/r}, \quad r \in \mathbb{R} \setminus \{0\},$$

and

$$M_0(x) = (x_1 x_2 \dots x_n)^{1/n}.$$

We call  $M_r(x)$  the  $r$ th power mean of  $x$ .
Claim:

$$\lim_{r \rightarrow 0} M_r(x) = M_0(x).$$


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38 \[V_n=\left[\begin{array}{ccccc}
39 1 & 1 & 1 & \dots & 1 \\
40 x_1 & x_2 & x_3 & \dots & x_n \\
41 x_1^2 & x_2^2 & x_3^2 & \dots & x_n^2 \\
42 \vdots & \vdots & \vdots & \ddots & \vdots \\
43 x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \dots & x_n^{n-1} \\
44 \end{array}\right]. \\
45 We call  $V_n$  the Vandermonde matrix of order  $n$ . \\
46 Claim: \\
47 
$$\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i).$$
 \\
48 \end{itemize} \\
49 \end{block} \\
50 \end{frame} \\
51 \begin{frame}{Question 4} \\
52 \begin{block}{} \\
53 \begin{itemize} \\
54 \item  $3^3 + 4^3 + 5^3 = 6^3$  \\
55 \item  $\sqrt{100} = 10$  \\
56 \item  $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$  \\
57 \item  $\sum_{k=1}^n k = \frac{n(n+1)}{2}$  \\
58 \item  $\frac{\pi}{4} = \frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots$ 

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58 \item $$\frac{\pi}{4} =
\frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots$$
59 \end{itemize}
60 \end{block}
61 \end{frame}
62 \begin{frame}{Remaining parts of Question 4}
63 \begin{block}{}
64 \begin{itemize}
65 \item $$\cos\theta = \sin(90^\circ - \theta)$$
66 \item $$e^{i\theta} = \cos\theta + i\sin\theta$$
67 \item $$\lim_{\theta \rightarrow 0} \frac{\sin\theta}{\theta} = 1$$
68 \item $$\lim_{x \rightarrow \infty} \frac{\pi(x)}{x/\log(x)} = 1$$
69 \item $$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$
70 \end{itemize}
71 \end{block}
72 \end{frame}
73 \begin{frame}{Question 5}
74 \begin{block}{}
75 \begin{itemize}

```

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74 - \begin{block}{}
75 - \begin{itemize}
76   \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  $c+a > b$ .
77   \item The area of a triangle with side lengths  $a$ ,
        $b$ ,  $c$  is given by Heron's formula:
78    $A = \sqrt{s(s-a)(s-b)(s-c)}$ ,
       where  $s$  is the semiperimeter  $(a+b+c)/2$ .
79   \item The volume of a regular tetrahedron of edge
       length  $s$  is  $\frac{\sqrt{2}}{12}s^3$ .
80   \item The quadratic equation  $ax^2 + bx + c = 0$ 
       has roots  $r_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ .
81
82 \end{itemize}
83 \end{block}
84 \end{frame}
85 - \begin{frame}{Remaining Parts of Question 5}
86 - \begin{block}{}
87 - \begin{itemize}
88   \item The derivative of a function  $f$ , denoted
        $f'$ , is defined by  $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ .
89   \item A real valued function  $f$  is  $\lambda$ -convex if

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89 \item A real-valued function  $f$  is convex
on a interval  $I$  if  $f(\lambda x + (1 - \lambda)y) \leq \lambda f(x) + (1 - \lambda)f(y)$ ,
for all  $s, y \in I$  and  $0 \leq \lambda \leq 1$ .
90 \end{itemize}
91 \end{block}
92 \end{frame}
93 \begin{frame}{Remaining Parts of Question 5}
94 \begin{block}{}
95 \begin{itemize}
96 \item The general solution to the differential
equation  $y'' - 3y' + 2y = 0$  is  $y = C_1e^{\lambda x} + C_2e^{2x}$ .
97 \item The Fermat number  $F_n$  is defined as
 $F_n = 2^{2^n} + 1$ ,  $n \geq 0$ .
98 \end{itemize}
99 \end{block}
100 \end{frame}
101 \begin{frame}{Question 6}
102 \begin{block}{}
103 \begin{itemize}
104 \item  $\frac{d}{dx} \left( \frac{x}{x+1} \right) =$ 

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103 \begin{itemize}
104 \item  $\frac{d}{dx} \left( \frac{x}{x+1} \right) =$ 
 $\frac{1}{(x+1)^2}$ 
105 \item  $\lim_{n \rightarrow \infty} \left( 1 + \frac{1}{n} \right)^n = e$ 
106 \item \left| \begin{array}{cc}
107 a & b \\
108 c & d \end{array} \right| = ad - bc
109 \end{array} \right| = ad - bc
110 \item  $\cos \theta = \left[ \begin{array}{cc}
111 \cos \theta & -\sin \theta \\
112 \sin \theta & \cos \theta \end{array} \right]$ 
113 \end{array} \right]
114 \end{itemize}
115 \end{block}
116 \end{frame}
117 \begin{frame}{Remaining Parts of Question 6}
118 \begin{block}{}
119 \begin{itemize}
120 \item \left| \begin{array}{ccc}
121 \mathbf{i} & \mathbf{j} & \mathbf{k} \\
122 a_1 & a_2 & a_3 \\
123 b_1 & b_2 & b_3 \end{array} \right| = \left| \begin{array}{cc}
124

```

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124 \end{array}\right| = \left|\begin{array}{cc}
125 a_2 & a_3 \\
126 b_2 & b_3 \\
127 \end{array}\right| \textbf{i} - \left|\begin{array}{cc}
128 a_1 & a_3 \\
129 b_1 & b_3 \\
130 \end{array}\right| \textbf{j} + \left|\begin{array}{cc}
131 a_1 & a_2 \\
132 b_1 & b_2 \\
133 \end{array}\right| \textbf{k}
134 \item \left[\begin{array}{cc}
135 a_{11} & a_{12} \\
136 a_{21} & a_{22} \\
137 \end{array}\right] \left[\begin{array}{cc}
138 b_{11} & b_{12} \\
139 b_{21} & b_{22} \\
140 \end{array}\right] = \left[\begin{array}{cc}
141 a_{11}b_{11} + a_{12}b_{21} & a_{11}b_{12} + a_{12}b_{22} \\
142 a_{21}b_{11} + a_{22}b_{21} & a_{21}b_{12} + a_{22}b_{22} \\
143 \end{array}\right]
144 \item f(x) = \left\{ \begin{array}{cc}
145 -x^2 & x < 0 \\

```

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143 \end{array}\right]$$
144 \item $$f(x) = \left\{\begin{array}{cc}
145 -x^2 ,& x < 0 \\
146 x^2 ,& 0 \leq x \leq 2 \\
147 4 ,& x > 2
148 \end{array}\right. $$
149 \end{itemize}
150 \end{block}
151 \end{frame}
152 \begin{frame}{Question 7}
153 \begin{block}{}
154 \begin{itemize}
155 \item $$\begin{array}{rc}
156 1 + 2 & = & 3 \\[0.4cm]
157 4 + 5 + 6 & = & 7 + 8 \\[0.4cm]
158 9 + 10 + 11 + 12 & = & 13 + 14 + 15 \\[0.4cm]
159 16 + 17 + 18 + 19 + 20 & = & 21 + 22 + 23 + 24 \\[0.4cm]
160 25 + 26 + 27 + 28 + 29 + 30 & = & 31 + 32 + 33 + 34 \\
161 & & + 35
162 \end{array} $$
163 \end{itemize}
164 \end{block}
165 \end{frame}

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165 - \begin{frame}{Remaining Parts of Question 7}
166 - \begin{block}{}
167 - \begin{itemize}
168   \item $$\begin{array}{l}
169     (a+b)^2 & = & (a + b)(a + b) \\
170     & = & (a + b)a + (a+b)b \\
171     & = & a(a + b) + b(a + b) \\
172     & = & a^2 + ab + ba + b^2 \\
173     & = & a^2 + ab + ab + b^2 \\
174     & = & a^2 + 2ab + b^2
175   \end{array}$$
176 - \end{itemize}
177 - \end{block}
178 - \end{frame}
179 - \begin{frame}{Remaining Parts of Question 7}
180 - \begin{block}{}
181 - \begin{itemize}
182   \item $$\begin{array}{l}
183     \tan(\alpha + \beta + \gamma) & = & \frac{\tan(\alpha + \beta) + \tan\gamma}{1 - \tan(\alpha + \beta)\tan\gamma} \\
184     & = & \frac{\frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} + \tan\gamma}{1 - \left(\frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}\right)\tan\gamma}
185   \end{array}$$
186 - \end{itemize}
187 - \end{block}
188 - \end{frame}

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184 & = & \frac{\frac{\tan\alpha + \tan\beta}{1 - \tan\alpha \tan\beta} + \tan\gamma}{1 - \left(\frac{\tan\alpha + \tan\beta}{1 - \tan\alpha \tan\beta}\right)\tan\gamma} \\
& \\
185 & = & \frac{\tan\alpha + \tan\beta + (1 - \tan\alpha \tan\beta)\tan\gamma}{\tan\alpha + \tan\beta + \tan\gamma - \tan\alpha \tan\beta \tan\gamma} \\
& \\
186 & = & \frac{\tan\alpha + \tan\beta + \tan\gamma - \tan\alpha \tan\beta \tan\gamma}{\tan\alpha + \tan\beta + \tan\gamma - \tan\alpha \tan\beta \tan\gamma} \\
& \\
187 \end{array}$$
188 \end{itemize}
189 \end{block}
190 \end{frame}
191 \begin{frame}{Remaining Parts of Question 7}
192 \begin{block}{}
193 \begin{eqnarray*}
194 \bullet \hspace{3cm}
195 \prod_p \left( 1 - \frac{1}{p^2} \right) = & & \prod_p \frac{1}{1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots} \\
& & \\
196 & = & \left( \prod_p \left( 1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots \right) \right)^{-1}

```

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193 - \begin{eqnarray*}
194 \bullet \hspace{3cm}
195 \prod_{p} \left( 1 - \frac{1}{p^2} \right) & = & \prod_{p} \left( 1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots \right) \\
196 & = & \left( \prod_{p} \left( 1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots \right) \right)^{-1} \\
197 & = & \left( 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots \right)^{-1} \\
198 & = & \frac{6}{\pi^2}
199 \end{eqnarray*}
200 \end{block}
201 \end{frame}
202 - \begin{frame}{Thank you}
203 - \begin{block}{}
204 {\includegraphics[scale=0.7]{Thankyou.jpeg}}
205
206 \end{block}
207 \end{frame}
208 \end{document}
209
210

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Shreya Jain  
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University Roll no.- 20044563019



Mata Sundri College for Women,  
University of Delhi

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- Let  $x = (x_1, \dots, x_n)$ , where the  $x_i$  are non-negative real numbers. Set
$$M_r(x) = \left( \frac{x_1^r + x_2^r + \dots + x_n^r}{n} \right)^{1/r}, \quad r \in \mathbb{R} \setminus \{0\},$$
and
$$M_0(x) = (x_1 x_2 \dots x_n)^{1/n}.$$
We call  $M_r(x)$  the  $r$ th power mean of  $x$ .  
Claim:  $\lim_{r \rightarrow 0} M_r(x) = M_0(x)$ .

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