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1 \documentclass{beamer}
2 \usepackage[utf8]{inputenc}
3
4 \title{Assignment - 2}
5 \author{DEEKSHA \\ MAT/20/140 \\ 20044563051}
6
7 \date{}
8 \usepackage{graphicx}
9 \usetheme{Warsaw}
10 \institute{\large Mata Sundri College For Women\\
   University of Delhi}}
11 \begin{document}
12 \begin{frame}
13 \titlepage
14 \end{frame}
15 \begin{frame}{Example - 9.5}
16 \begin{itemize}
17 \item Let  $\mathbf{x} = (x_1, \dots, x_n)$ , where  $x_i$  are non-negative real numbers. Set
18  $M_r(\mathbf{x}) = \left( \frac{x_1^r + x_2^r + \dots + x_n^r}{n} \right)^{1/r}$ ,  $r \in \mathbf{R} \setminus \{0\}$ , and
19  $M_0(\mathbf{x}) = \left( x_1 x_2 \dots x_n \right)^{1/n}$ .
20 We call  $M_r(\mathbf{x})$  the  $r^{\text{th}}$  power mean of  $\mathbf{x}$ .
21
22 Claim:
23  $\lim_{r \rightarrow 0} M_r(\mathbf{x}) = M_0(\mathbf{x})$ .
24 \end{itemize}
25 \end{frame}
26 \begin{frame}{Example-9.5 continued..}
27 \begin{itemize}
28 \item Define
29  $V_n = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_2 & x_3 & \dots & x_n \\ x_1^2 & x_2^2 & x_3^2 & \dots & x_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \dots & x_n^{n-1} \end{bmatrix}$ 
30 We call  $V_n$  the Vandermonde matrix of order  $n$ .
31
32 Claim :
33  $\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i)$ .
34 \end{itemize}
35 \end{frame}
36 \begin{frame}{Question 4: Make the equations.}
37 \begin{itemize}
38 \end{itemize}
39 \end{frame}
40 \end{frame}
41 \begin{frame}{Question 4: Make the equations.}
42 \begin{itemize}
43 \end{itemize}
44 \end{frame}

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41 \begin{frame}{Question 4: Make the equations.}
42 \begin{itemize}
43     \item  $3^3 + 4^3 + 5^3 = 6^3$ 
44     \item  $\sqrt{100} = 10$ 
45     \item  $(a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$ 
46     \item  $\sum_{k=1}^n k = \frac{n(n+1)}{2}$ 
47     \item  $\frac{\pi}{4} = \frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots$ 
48 \end{itemize}
49 \end{frame}
50 \begin{frame}{Remaining parts of Q4}
51 \begin{itemize}
52     \item  $\cos\theta = \sin(90^\circ - \theta)$ 
53     \item  $e^{i\theta} = \cos\theta + i\sin\theta$ 
54     
$$\lim_{\theta \rightarrow 0} \frac{\sin\theta}{\theta} = 1$$

55     
$$\lim_{x \rightarrow \infty} \frac{\pi(x)}{x \log x} = 1$$

56     
$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

57 \end{itemize}
58 \end{frame}
59 \begin{frame}{Question 5: Typeset the sentences.}
60 \begin{itemize}
61     \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  $c+a>b$ .
62     \item The area of a triangle with side lengths  $a, b, c$  is given by Heron's formula:
63     
$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

64     where  $s$  is the semiperimeter  $(a+b+c)/2$ .
65     \item The volume of a regular tetrahedron of edge length 1 is  $\sqrt{2}/12$ .
66 \end{itemize}
67 \end{frame}
68 \begin{frame}{Remaining parts Q5}
69 \begin{itemize}
70     \item The quadratic equation  $ax^2 + bx + c = 0$  has roots  $r_1, r_2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ .
71     \item The derivative of a function  $f$ , denoted  $f'$ , is defined by  $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ .
72     \item A real-valued function  $f$  is 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  $0 \leq \lambda \leq 1$ .
73 \end{itemize}
74 \end{frame}
75 \begin{frame}{Remaining part of Q5}
76 \end{frame}

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78 * \begin{frame}{Remaining part of Q5}
79 * \begin{itemize}
80 |   \item The general solution to the differential
81 |     equation
82 |      $\$y''' - 3y' + 2y = 0$  is  $\$y = C_1 e^x + C_2 e^{2x}$ .
83 |     \item The \emph{Fermat number}  $F_n$  is defined as
84 |        $F_n = 2^{2^n}$ ,  $n \geq 0$ 
85 |   \end{itemize}
86 * \end{frame}
87 * \begin{frame}{Question 6: Make the equations}
88 * \begin{itemize}
89 |   \item  $\frac{d}{dx} \left( \frac{x}{x+1} \right) = \frac{1}{(x+1)^2}$ 
90 |   \item  $\lim_{n \rightarrow \infty} \left( 1 + \frac{1}{n} \right)^n = e$ 
91 |   \item 
$$\begin{array}{c|c}
92 |     a & b \\
93 |     c & d
94 |   \end{array} = ad - bc$$

95 |   \item  $R_\theta = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ 
96 |   \end{itemize}
97 * \end{frame}
98 * \begin{frame}{Remaining parts of Q6}
99 * \begin{itemize}
100 |   \item 
$$\begin{array}{ccc}
101 |     \textbf{i} & \textbf{j} & \textbf{k} \\
102 |     a_1 & a_2 & a_3 \\
103 |     b_1 & b_2 & b_3
104 |   \end{array}$$

105 |   \item 
$$\begin{array}{c}
106 |     a_2 & a_3 \\
107 |     b_2 & b_3
108 |   \end{array} = \begin{bmatrix} a_2 & a_3 \\ b_2 & b_3 \end{bmatrix}$$

109 |   \item 
$$\begin{array}{c}
110 |     a_1 & a_3 \\
111 |     b_1 & b_3
112 |   \end{array} = \begin{bmatrix} a_1 & a_3 \\ b_1 & b_3 \end{bmatrix}$$

113 |   \item 
$$\begin{array}{c}
114 |     a_1 & a_2 \\
115 |     b_1 & b_2
116 |   \end{array} = \begin{bmatrix} a_1 & a_2 \\ b_1 & b_2 \end{bmatrix}$$

117 |   \item 
$$\begin{array}{c}
118 |     a_{11} & a_{12} \\
119 |     a_{21} & a_{22}
120 |   \end{array} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

121 |   \item 
$$\begin{array}{c}
122 |     a_{11} & a_{12} \\
123 |     a_{21} & a_{22}
124 |   \end{array} \begin{array}{c}
125 |     b_{11} & b_{12} \\
126 |     b_{21} & b_{22}
127 |   \end{array} = \begin{bmatrix} a_{11}b_{11} + a_{12}b_{21} & a_{11}b_{12} + a_{12}b_{22} \\ a_{21}b_{11} + a_{22}b_{21} & a_{21}b_{12} + a_{22}b_{22} \end{bmatrix}$$

128 |   \end{itemize}

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b_{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] $$

\item $f(x)\left\{\begin{array}{ll}
\begin{array}{ll}
\begin{array}{ll}
-x^2 , & x<0 \\
x^2 , & 0\leq x\leq 2 \\
4, & x>2
\end{array}\right.\\
\end{array}\right.$
\end{itemize}
\end{frame}

\begin{frame}{Question 7: Make multi-line equations.}

\begin{eqnarray*}
1+2&=&3\\
4+5+6&=&7+8\\
9+10+11+12&=&13+14+15\\
16+17+18+19&=&21+22+23+24\\
25+26+27+28+29+30&=&31+32+33+34+35
\end{eqnarray*}
\end{frame}

\begin{frame}{Second part of Q 7}

\begin{itemize}
\item \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\\
&=&ab+ab+b^2\\
&=&a^2+2ab+b^2
\end{eqnarray*}
\end{itemize}
\end{frame}

\begin{frame}{Third part Q 7}

\begin{itemize}
\item \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)+\tan(\gamma)-\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(\alpha)\tan(\gamma)-\tan(\beta)\tan(\gamma)}{1-\tan(\alpha)\tan(\beta)-\tan(\alpha)\tan(\gamma)-\tan(\beta)\tan(\gamma)}
\end{eqnarray*}
\end{itemize}
\end{frame}

\begin{frame}{Fourth part Q 7}

\begin{itemize}
\item \begin{eqnarray*}
\prod_{p}\left(1-\frac{1}{p^2}\right)&=&\prod_{p}\frac{1+\frac{1}{p^2}+\frac{1}{p^4}+\dots}{1-\frac{1}{p^2}}\\
&=&\prod_{p}\frac{(p^2+1)(p^4+1)\dots}{(p^2-1)(p^4-1)\dots}\\
&=&\prod_{p}\frac{(p^2+1)(p^4+1)\dots}{p(p-1)(p^2+1)(p^4+1)\dots}\\
&=&\prod_{p}\frac{1}{p(p-1)}=\frac{1}{2} \cdot \frac{1}{3} \cdot \frac{1}{5} \cdot \frac{1}{7} \cdots
\end{eqnarray*}
\end{itemize}
\end{frame}

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\begin{frame}{Third part Q 7}
\begin{itemize}
\item \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 - \left( \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta} \right) \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{itemize}
\end{frame}

\begin{frame}{Fourth part Q 7}
\begin{itemize}
\item \begin{eqnarray*}
\prod_p \left( 1 - \frac{1}{p^2} \right) &=& \prod_p \frac{1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots}{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{itemize}
\end{frame}

\begin{frame}
\begin{center}
\includegraphics[width=11cm, height=8cm]{Thankyou.jpg}
\end{center}
\end{frame}

\end{document}

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