ASSIGNMENT -02

Aditi Nehra

MAT/20/112

Mata Sundri College for Women

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```
\usepackage[linewidth=1pt]{mdframed}
\usetheme{Darmstadt}
\useoutertheme{miniframes}
\usepackage{times}
 \usecolortheme[named=purple]{structure}
 \usepackage[left=0.9in, right=0.8in]{geometry}


\title{\huge Assignment 2}
\subtitle{\large Aditi Nehra}
\institute{\large Mata Sundri College For Women}
\author{\large MAT/20/112\\University Roll no. 20044563036}

\date{}
\begin{document}
\maketitle
\begin{frame}{page no. 69}

 \begin{mdframed}1. Let $${x}=(x_1, \ldots,x_n)$$,
      where the $x_i$ are nonnegative real numbers.
      Set
      \[
      M_r(\mathbf{x})=\left(\frac{x_1^r+x_2^r+\cdots+x_n^r}{n}\right)^{1/r}, r\in \bfseries R \setminus
      {\left\{0\right\}}
      \]\\
      and\\
      \[
      M_o(\mathbf{x})=\left(x_1 x_2\ldots x_n \right)^{1/n}
      \]
      We  call $M_r(\mathbf{x})$ the \emph{$r$th power mean} of $\mathbf{x}$.\\
      Claim:\\
      \[
```

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```
      \]
      \lim_{r \rightarrow 0} M_r(\mathbf{x})=M_o(\mathbf{x}).
      \]
    \end{mdframed}

  \end{frame}
    \begin{frame}
      \begin{mdframed}


      2. Define
      \[
      V_n=
      \left[
      \begin{array}{ccccc}
      1  & 1 & 1  & \cdots & 1 \\
      x_1 & x_2 & x_3 & \cdots & x_n\\
      x_1^2 & x_2^2 & x_3^2& \cdots & x_n^2\\
      \vdots &  \cdot\vdots &  \vdots &  \ddots &  \vdots \\
      x_1^{n-2} & x_2^{n-2} & x_3^{n-2}& \cdots & x_n^{n-2}\\
      \end{array}
      \right]
      \]\\
      We call $V_n$ the \emph{Vandermonde matrix} of order $n$.\\
      Claim:\\
      \[
      \det V_n=\prod_{1\leq i <j \leq n}(x_j-x_j)
      \]\\\end{mdframed}

  \end{frame}
```

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```
\begin{frame}{Question 4}
  4. Make the following equations\\
  \begin{mdframed}
    $$3^3+4^3+5^3=6^3$$
    \end{mdframed}
    \begin{mdframed}
     $$\sqrt{100}=10$$
   \end{mdframed}
  \begin{mdframed}
    $$(a+b)^3=a^3+3a^2b+3b^2a+b^3$$
    \end{mdframed}
    \begin{mdframed}
  $$\sum^{n}_{k=1} k=\frac{n(n+1)}{2}$$
    \end{mdframed}
    \begin{mdframed}
    $$\frac{\pi}{4}=\frac{1}{1}-\frac{1}{3}+\frac{1}{7}+\frac{1}{9}-\frac{1}{11}+\cdots$$
    \end{mdframed}
\end{frame}
\begin{frame}
\begin{mdframed}
 $$Cos\theta=Sin(90^{\circ}-\theta)$$
 \end{mdframed}
 \begin{mdframed}
  $$e^i^\theta=cos \theta+ i sin \theta$$
   \end{mdframed}
   \begin{mdframed}
    $$lim_\theta _\rightarrow _0\frac{Sin\theta}{\theta}=1$$
     \end{mdframed}
     \begin{mdframed}
      $$lim_x_\rightarrow_\infty \frac{\pi(x)}{x/logx}=1$$
    \end{mdframed}
    \begin{mdframed}
```

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```
    \begin{mdframed}
     $$\int_{\infty}^{-\infty}e^-^{x^{2}}dx=\sqrt{\pi}$$
    \end{mdframed}
\end{frame}
\begin{frame}{Question 5}
5. Typeset the following sentences.\\
\begin{mdframed}
   Positive numbers a, b, c are the side of  lengths of triangle if and only if$$ a+b>c, b+c>a, c+a>b.$$
  \end{mdframed}
  \begin{mdframed}
   The area of the triangle with the side lengths a,b,c given by \emph{Heron's formula} $$A=\sqrt{s(s-a)(s-b_(s-c)}$$ where s is the
   semiperimeter$$(a+b+c)/2$$
   \end{mdframed}
   \end{frame}
   \begin{frame}


   \begin{mdframed}
      The volume of a regular tetrahedon of edge length 1 is $$\sqrt{2}/12$$
   \end{mdframed}
   \begin{mdframed}
      The quadratic equation $$ax^2+bx+c=0$$ has roots$$r_1.r_2=\frac{-b\pm \sqrt{b^2-4ac}}{2a}$$
   \end{mdframed}
   \end{frame}
   \begin{frame}
  \begin{mdframed}
      The derivative of a function \emp{f}, denoted \emp{$$f^'$$} is defined by $$=lim_h _\rightarrow _0 \frac{f(x+h)-f(x)}{h}$$
  \end{mdframed}
   \begin{mdframed}
   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            $$ 0 \leq \lambda \leq 1.$$
\end{mdframed}
```

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```
125  \end{mdframed}
126     \end{frame}
127  \begin{frame}
128
129   \begin{mdframed}
130     The general solution to the differential equation$$y^{''}-3y^{'}+2y=0$$
131  $$y=C_1e^x+C_2e^{2x}$$
132   \end{mdframed}
133  \begin{mdframed}
134  The \emph{Fermat numbers} Fn is defined as\\ $$F_n=2^{2}^n,n\geq 0$$\\
135    \end{mdframed}
136  \end{frame}
137  \begin{frame}{Question 6}
138  6. Make the following equations. Notice the large delimiters\\
139  \begin{mdframed}
140   $$\frac{d}{dx}\left(\frac{x}{x+1}\right)=\frac{1}{(x+1)^2}$$
141  \end{mdframed}
142  \begin{mdframed}
143   $$ lim_n _\rightarrow _\infty \left(1+\frac  {1}{n}\right)^n=c$$
144  \end{mdframed}
145  \begin{mdframed}
146  $$\left|
147   \begin{array}{cc}
148       a & b \\
149       c & d\\
150
151   \end{array}
152   \right|=ad-bc$$
153     \end{mdframed}
154   \begin{mdframed}
155
156
```

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```
155
156
157  $$R_\theta=\left|
158   \begin{array}{cc}
159   Cos_\theta & -Sin_\theta\\
160   Sin_\theta & Cos_\theta\\
161    \end{array}
162  \right|$$
163
164  \end{mdframed}
165  \end{frame}
166
167  \begin{frame}
168
169
170  \begin{mdframed}
171  $$ \left|
172   \begin{array}{ccc}
173       i & j & k\\
174       a_1 & b_1 & c_1\\
175       a_2 & b_2 & c_2\\
176
177  \end{array}
178  \right| =\left|
179  \begin{array}{cc}
180       a_2& a_3 \\
181       b_2 & b_3\\
182
183  \end{array}
184  \right| i -\left|
185  \begin{array}{cc}
186       a_1& a_3\\
```

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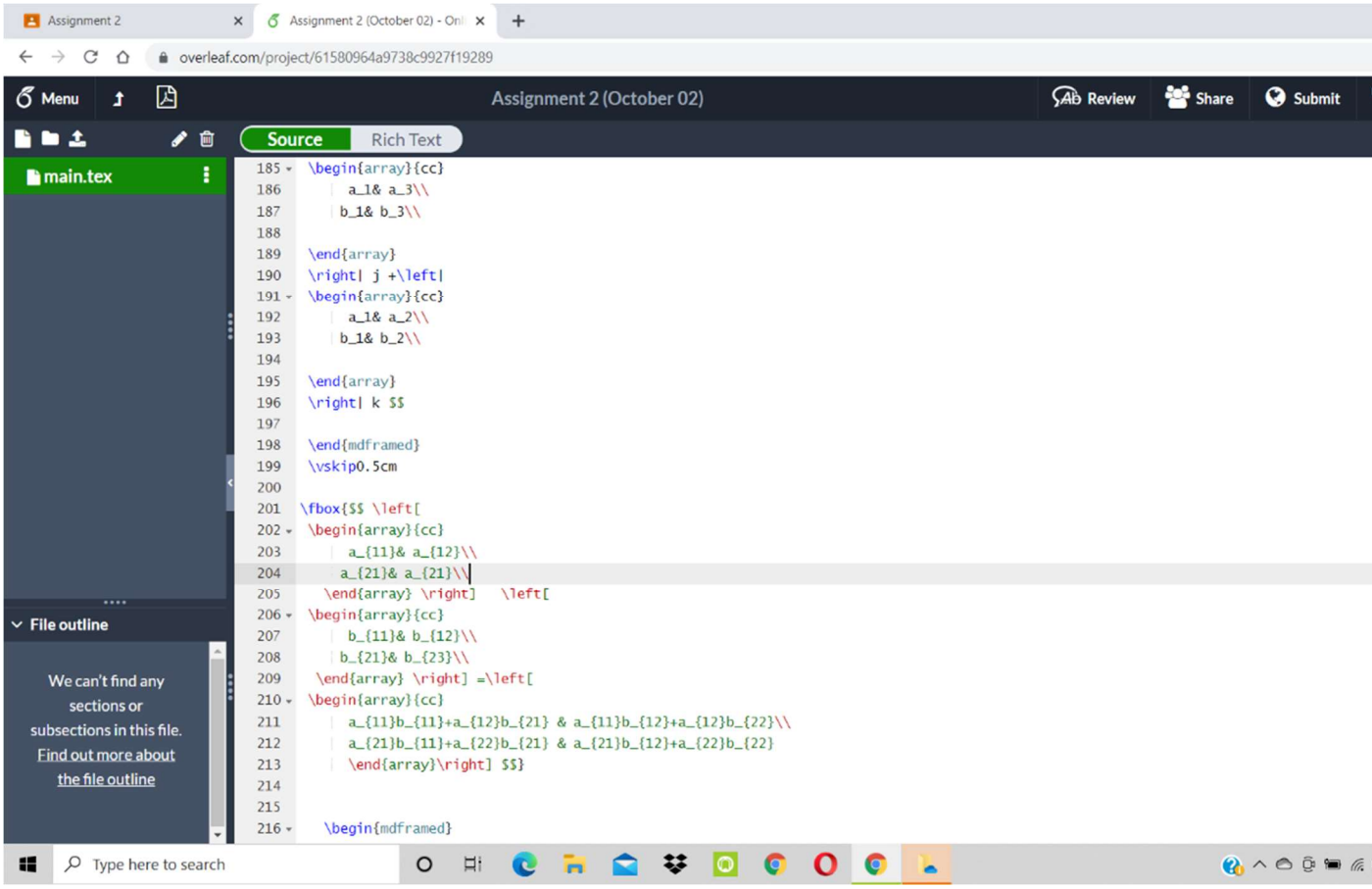
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\begin{array}{cc}
a_1& a_3\\
b_1& b_3\\
\end{array}
\right| j +\left|
\begin{array}{cc}
a_1& a_2\\
b_1& b_2\\
\end{array}
\right| k $$
\end{mdframed}
\vskip0.5cm
\fbox{$$ \left[
\begin{array}{cc}
a_{11}& a_{12}\\
a_{21}& a_{21}\\
\end{array} \right] \left[
\begin{array}{cc}
b_{11}& b_{12}\\
b_{21}& b_{23}\\
\end{array} \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] $$}
\begin{mdframed}
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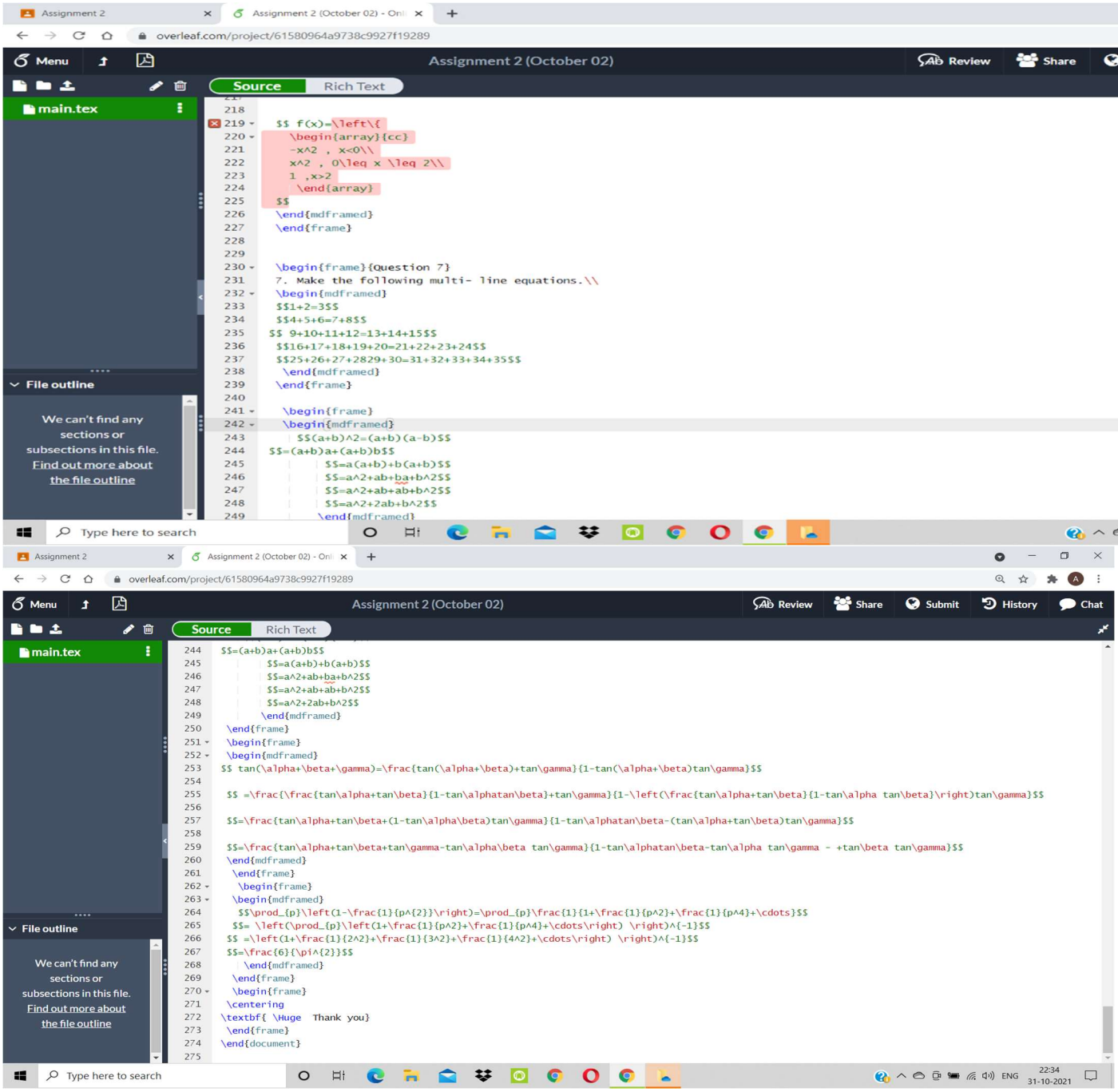


```
$$ f(x)=\left\{
   \begin{array}{cc}
   -x^2 , x<0\\
   x^2 , 0\leq x \leq 2\\
   1 ,x>2
    \end{array}
  $$
  \end{mdframed}
  \end{frame}


  \begin{frame}{Question 7}
  7. Make the following multi- line equations.\\
  \begin{mdframed}
  $$1+2=3$$
  $$4+5+6=7+8$$
 $$ 9+10+11+12=13+14+15$$
  $$16+17+18+19+20=21+22+23+24$$
  $$25+26+27+2829+30=31+32+33+34+35$$
   \end{mdframed}
  \end{frame}

   \begin{frame}
   \begin{mdframed}
     $$(a+b)^2=(a+b)(a-b)$$
 $$=(a+b)a+(a+b)b$$
        $$=a(a+b)+b(a+b)$$
        $$=a^2+ab+ba+b^2$$
        $$=a^2+ab+ab+b^2$$
        $$=a^2+2ab+b^2$$
       \end{mdframed}
  \end{frame}
  \begin{frame}
  \begin{mdframed}
$$ tan(\alpha+\beta+\gamma)=\frac{tan(\alpha+\beta)+tan\gamma}{1-tan(\alpha+\beta)tan\gamma}$$

 $$ =\frac{\frac{tan\alpha+tan\beta}{1-tan\alphatan\beta}+tan\gamma}{1-\left(\frac{tan\alpha+tan\beta}{1-tan\alpha tan\beta}\right)tan\gamma}$$

 $$=\frac{tan\alpha+tan\beta+(1-tan\alpha\beta)tan\gamma}{1-tan\alphatan\beta-(tan\alpha+tan\beta)tan\gamma}$$

 $$=\frac{tan\alpha+tan\beta+tan\gamma-tan\alpha\beta tan\gamma}{1-tan\alphatan\beta-tan\alpha tan\gamma - +tan\beta tan\gamma}$$
  \end{mdframed}
   \end{frame}
    \begin{frame}
   \begin{mdframed}
     $$\prod_{p}\left(1-\frac{1}{p^{2}}\right)=\prod_{p}\frac{1}{1+\frac{1}{p^2}+\frac{1}{p^4}+\cdots}$$
    $$= \left(\prod_{p}\left(1+\frac{1}{p^2}+\frac{1}{p^4}+\cdots\right) \right)^{-1}$$
  $$ =\left(1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\cdots\right) \right)^{-1}$$
  $$=\frac{6}{\pi^{2}}$$
     \end{mdframed}
   \end{frame}
   \begin{frame}
  \centering
 \textbf{ \Huge  Thank you}
  \end{frame}
 \end{document}
```