

main.tex

File outline

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1 \documentclass{beamer}
2 \usepackage[utf8]{inputenc}
3 \usepackage{gensymb}
4 \usepackage{xcolor}
5 \usepackage{graphicx}
6 \title{ASSIGNMENT 2 }
7 \institute{KHUSHBU SINGH \\\\ ROLL NUMBER MAT/20/103 \\\\ UNIVERSITY ROLL NUMBER 2004456301}
8 \author{ MATA SUNDRI COLLEGE FOR WOMEN \\\\ DELHI UNIVERSITY}
9
10 \date{}
11 \usetheme{AnnArbor}
12
13 \begin{document}
14 \begin{frame}
15 \titlepage
16 \end{frame}
17
18 \begin{frame}{Examples on Page 69}
19 1) Let  $x=(x_1,x_2,\dots,x_n)$  where the  $x_i$  are non negative real numbers. Set  $M_r(x) = \left(\frac{x_1^r+x_2^r+\dots+x_n^r}{n}\right)^{\frac{1}{r}}, r \in \mathbb{R} \setminus \{0\}$ , and
20  $M_0(x)=(x_1x_2\dots x_n)^{\frac{1}{n}}$ 
21 We call  $M_r(x)$  the rth power mean of  $x$ .
22 Claim:  $\lim_{r \rightarrow 0} M_r(x) = M_0(x)$ 
23 \end{frame}
24
25 \begin{frame}{Examples on Page 69}
26 2) Define
27 
$$V_n = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_1 & x_1 & \dots & x_1 \\ x_1^2 & x_1^2 & x_1^2 & \dots & x_1^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_1^{n-1} & x_1^{n-1} & \dots & x_1^{n-1} \end{bmatrix}$$


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ASSIGNMENT 2

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Examples on Page 69

1) Let $x=(x_1,x_2,\dots,x_n)$ where the x_i are non negative real numbers. Set $M_r(x) = \left(\frac{x_1^r+x_2^r+\dots+x_n^r}{n}\right)^{\frac{1}{r}}, r \in \mathbb{R} \setminus \{0\}$, and $M_0(x)=(x_1x_2\dots x_n)^{\frac{1}{n}}$. We call $M_r(x)$ the rth power mean of x . Claim: $\lim_{r \rightarrow 0} M_r(x) = M_0(x)$

Examples on Page 69

2) Define
$$V_n = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_1 & x_1 & \dots & x_1 \\ x_1^2 & x_1^2 & x_1^2 & \dots & x_1^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_1^{n-1} & x_1^{n-1} & \dots & x_1^{n-1} \end{bmatrix}$$
 We call V_n the Vandermonde matrix of order n . Claim: $\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i)$

Q4 Make the following equations

$$3^2 + 4^2 + 5^2 = 0^2$$

$$\sqrt{100} + 10$$

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$\sum_{k=1}^n \frac{k(k+1)}{2}$$

$$\frac{1}{4} - \frac{1}{1} + \frac{1}{4} - \frac{1}{9} + \dots$$

Q4 make the following equations

$$\cos \theta = \sin(\theta - \pi)$$

```

25 \begin{frame}{Examples on Page 69}
26 2) Define
27 $$V_n=\left[\begin{array}{ccccc}
28 1&1&1&\dots&1\\
29 x_1&x_2&x_3&\dots&x_n\\
30 x_1^2&x_2^2&x_3^2&\dots&x_n^2\\
31 \vdots&\vdots&\vdots&\ddots&\vdots\\
32 x_1^{n-1}&x_2^{n-1}&x_3^{n-1}&\dots&x_n^{n-1}
33 \end{array}\right]$$
34 We call  $V_n$  the vandermonde matrix of order  $n$ .
35 Claim:  $\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i)$ 
36 \end{frame}
37
38 \begin{frame}{Q4 Make the following equations}
39 \begin{itemize}
40 \item  $3^3+4^3+5^3=6^3$ 
41 \item  $\sqrt{100}+10$ 
42 \item  $(a+b)^3 = a^3+3a^2b+3ab^2+b^3$ 
43 \item  $\sum_{k=1}^n k = \frac{n(n+1)}{2}$ 
44 \item  $\frac{\pi}{4} = \frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$ 
45 \end{itemize}
46 \end{frame}
47
48 \begin{frame}{Q4 make the following equations}
49 \begin{itemize}
50 \item  $\cos \theta = \sin(90^\circ - \theta)$ 
51 \item  $e^{i\theta} = \cos \theta + i \sin \theta$ 
52 \item  $\cos \theta = \sin(90^\circ - \theta)$ 

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File outline

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ASSIGNMENT 2

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Examples on Page 69

1) Let (x_1, x_2, \dots, x_n) where the x_i are non negative real numbers. Set

$$M_r(x) = \left(\frac{x_1^r + x_2^r + \dots + x_n^r}{n} \right)^{1/r}, r \in \mathbb{R} \setminus \{0\},$$

and

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

We call $M_r(x)$ the real power mean of x .

Claim: $\lim_{r \rightarrow \infty} M_r(x) = M_0(x)$

Examples on Page 69

2) Define

$$V_n = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_2 & x_3 & \dots & x_n \\ x_1^2 & x_2^2 & x_3^2 & \dots & x_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \dots & x_n^{n-1} \end{bmatrix}$$

We call V_n the vandermonde matrix of order n .

Claim: $\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i)$

Q4 Make the following equations

- $3^3 + 4^3 + 5^3 = 6^3$
- $\sqrt{100} + 10$
- $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
- $\sum_{k=1}^n k = \frac{n(n+1)}{2}$
- $\frac{\pi}{4} = \frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$

Q4 make the following equations

- $\cos \theta = \sin(90^\circ - \theta)$
- $e^{i\theta} = \cos \theta + i \sin \theta$
- $\cos \theta = \sin(90^\circ - \theta)$

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49 \begin{itemize}
50   \item  $\cos\theta = \sin(90^\circ - \theta)$ 
51   \item  $e^{i\theta} = \cos\theta + i\sin\theta$ 
52   \item  $\lim_{\theta \rightarrow 0} \frac{\sin\theta}{\theta} = 1$ 
53   \item  $\lim_{x \rightarrow \infty} \frac{\pi(x)}{x \log x} = 1$ 
54   \item  $\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$ 
55 \end{itemize}
56 \end{frame}
57
58 \begin{frame}{Q5 Typeset the following sequences.}
59   \begin{itemize}
60     \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  $c+a > b$ 
61     \item The area of triangle with side lengths  $\{a, b, c\}$  is given by Heron's formula :  $A = \sqrt{s(s-a)(s-b)(s-c)}$ , where  $s$  is the semi perimeter  $\frac{a+b+c}{2}$ 
62     \item The volume of a regular tetrahedron of edge length 1 is  $\frac{\sqrt{2}}{12}$ 
63     \item The quadratic equation  $ax^2+bx+c=0$  has roots  $r_1, r_2 = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ 
64   \end{itemize}
65 \end{frame}
66
67 \begin{frame}{Q5 Typeset the following sequences.}
68   \begin{itemize}
69     \item The derivative of a function  $f$ , denoted  $f'$ , is defined by  $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ 
70     \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  $0 \leq \lambda \leq 1$ .
71   \end{itemize}
72 \end{frame}

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Examples on Page 69

1) Let $\{a_1, a_2, \dots, a_n\}$ where the a_i are non negative real numbers. Set $M_r(x) = \frac{(a_1^r + a_2^r + \dots + a_n^r)^{1/r}}$, $r \in \mathbb{R}(0, \infty)$.

and $M_0(x) = (a_1 \dots a_n)^{1/n}$

We call $M_r(x)$ the rth power mean of $\{a_i\}$.

Claim: $\lim_{r \rightarrow \infty} M_r(x) = M_\infty(x)$

Examples on Page 69

2) Define $V_n = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ a_1 & a_2 & a_3 & \dots & a_n \\ a_1^2 & a_2^2 & a_3^2 & \dots & a_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_1^{n-1} & a_2^{n-1} & a_3^{n-1} & \dots & a_n^{n-1} \end{bmatrix}$

We call V_n the Vandermonde matrix of order n .
Claim: $\det V_n = \prod_{1 \leq i < j \leq n} (a_j - a_i)$

Q4 Make the following equations

$x^2 + x^2 + x^2 = 0^2$

$\sqrt{100} + 10$

$(a + b)^2 = a^2 + 2ab + b^2$

$\sum_{k=1}^n \frac{k(k+1)}{2}$

$\frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \frac{1}{5} + \dots$

Q4 make the following equations

$\cos \theta = \sin(90^\circ - \theta)$

```

69 \begin{frame}{Q5 Typeset the following sequences.}
70 \begin{itemize}
71   \item The \emph{derivative} of a function \emph{f}.denoted \emph{f'} , is defined by
72   $$ f'(x)=\lim_{h\rightarrow 0} \frac{f(x+h)-f(x)}{h} $$
73   \item A real valued function \emph{f} is \emph{convex} on an interval \emph{I} if $$ f(\lambda x+(1-\lambda)y) \leq \lambda f(x) + (1-\lambda)f(y) $$ , for all \emph{x,y} \in I and $ 0 \leq \lambda \leq 1 . $
74   \item The general solution to the differential equation
75   $$y''-3y'+2y=0 $$ is
76   $$y=C_1e^{\lambda x} + C_2e^{2x} $$
77   \item The \emph{Fermat number} $F_n$ is defined as $$F_n= 2^{2^n} , n \geq 0. $$
78 \end{itemize}
79 \end{frame}
80
81 \begin{frame}{Q6 Make the following equations. }
82 \begin{itemize}
83   \item $$ \frac{d}{dx} \left( \frac{x}{x+1} \right) = \frac{1}{(x+1)^2} $$
84   \item $$ \lim_{n \rightarrow \infty} \left( 1 + \frac{1}{n} \right)^n = e $$
85   \item $$ \begin{array}{cc} a & b \\ c & d \end{array} = ad - bc $$
86   \item $$ R_{\theta} = \begin{array}{cc} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{array} $$
87   \item $$ \begin{array}{cc} a & b \\ c & d \end{array} = ad - bc $$
88   \item $$ \begin{array}{cc} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{array} $$
89   \item $$ \begin{array}{cc} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{array} $$
90   \item $$ \begin{array}{cc} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{array} $$
91   \item $$ \begin{array}{cc} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{array} $$
92 \end{itemize}
93 \end{frame}

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Examples on Page 69

1) Let (x_1, x_2, \dots, x_n) where the x_i are non-negative real numbers. Set

$$M(x) = \left(\frac{x_1^2 + x_2^2 + \dots + x_n^2}{n} \right)^{1/2}, x \in \mathbb{R}^n_+$$

and

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

We call $M(x)$ the r.m.s. power mean of x .

Claim: $\lim_{n \rightarrow \infty} M(x) = M_0(x)$

Examples on Page 69

2) Define

$$V_n = \begin{pmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_2 & x_3 & \dots & x_n \\ x_1^2 & x_2^2 & x_3^2 & \dots & x_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \dots & x_n^{n-1} \end{pmatrix}$$

We call V_n the Vandermonde matrix of order n .

Claim: $\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i)$

Q4 Make the following equations

- $3^2 + 4^2 + 5^2 = 6^2$
- $\sqrt{100} = 10$
- $(a + b)^2 = a^2 + 2ab + b^2$
- $\sum_{k=1}^n \frac{k(k+1)}{2}$
- $\frac{1}{4} - \frac{1}{5} + \frac{1}{6} - \frac{1}{7} + \dots$

Q4 make the following equations

- $\cos \theta = \sin(\theta - \pi/2)$

```

95 \begin{frame}{Q6 Make the following equations. }
96 \begin{itemize}
97   \item $$\left|\begin{array}{ccc}
98     \textbf{i}&\textbf{j}&\textbf{k} \\
99     a_1&a_2&a_3 \\
100    b_1&b_2&b_3
101 \end{array}\right|=\left|\begin{array}{cc}
102   a_2&a_3 \\
103   b_2&b_3
104 \end{array}\right| - \left|\begin{array}{cc}
105   a_1&a_3 \\
106   b_1&b_3
107 \end{array}\right| + \left|\begin{array}{cc}
108   a_1&a_2 \\
109   b_1&b_2
110 \end{array}\right| \textbf{k} $$
111 \item $$ \left[\begin{array}{cc}
112   a_{11}&a_{12} \\
113   a_{21}&a_{22}
114 \end{array}\right] \left[\begin{array}{cc}
115   b_{11}&b_{12} \\
116   b_{21}&b_{22}
117 \end{array}\right]=\left[\begin{array}{cc}
118   a_{11}b_{11}+a_{12}b_{12}&a_{11}b_{12}+a_{12}b_{22} \\
119   a_{21}b_{11}+a_{22}b_{21}&a_{21}b_{12}+a_{22}b_{22}
120 \end{array}\right] $$
121 \item $$f(x)=\left\{\begin{array}{l}
122   x^2, \quad x \geq 0 \\
123   x+2, \quad x < 0
\end{array}\right.

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Examples on Page 69

1) Let $x = (x_1, x_2, \dots, x_n)$ where the x_i are non-negative real numbers. Set

$$M(x) = \left(\frac{x_1 + x_2 + \dots + x_n}{n} \right)^n, \quad x \in \mathbb{R}_+^n,$$

and

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

We call $M(x)$ the arithmetic mean of x .

Claim: $\lim_{x \rightarrow 0} M(x) = M_0(x)$

Examples on Page 69

2) Define

$$V_n = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_2 & x_3 & \dots & x_n \\ x_1^2 & x_2^2 & x_3^2 & \dots & x_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \dots & x_n^{n-1} \end{bmatrix}$$

We call V_n the Vandermonde matrix of order n .

Claim: $\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i)$

Q4 Make the following equations

- $x^2 + x^2 = x^2$
- $\sqrt{100} = 10$
- $(x + 2)^2 = x^2 + 2x^2 + 2x^2 + 4$
- $\sum_{k=1}^n \frac{k(k+1)}{2}$
- $\frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \frac{1}{5} + \dots$

Q4 make the following equations

- $\cos \theta = \sin(\theta - \pi)$

main.tex

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120 \end{array}\right] $$
121 \item $$f(x)=\left\{\begin{array}{lr}-x^2, & x < 0 \\
122 x^2, & 0 \leq x \leq 2 \\
123 4, & x > 2 \end{array}\right. $$
124 \end{itemize}
125 \end{frame}
126
127 \begin{frame}{Q7. Make the following multi line equations }
128 \begin{eqnarray*}
129 1+2&=&3 \\
130 4+5+6&=&7+8 \\
131 9+10+11+12&=&13+14+15 \\
132 16+17+18+19+20&=&21+22+23+24 \\
133 25+26+27+28+29+30&=&31+32+33+34+35
134 \end{eqnarray*}
135 \end{frame}
136
137 \begin{frame}{Q7. Make the following multi line equations }
138 \begin{eqnarray*}
139 (a+b)^2&=&(a+b)(a+b) \\
140 &=&(a+b)a+(a+b)b \\
141 &=&a(a+b)+b(a+b) \\
142 &=&a^2+ab+ba+b^2 \\
143 &=&a^2+ab+ab+b^2 \\
144 &=&a^2+2ab+b^2
145 \end{eqnarray*}
146 \end{frame}
147

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ASSIGNMENT 2

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Examples on Page 69

1) Let $x = (x_1, x_2, \dots, x_n)$ where the x_i are non-negative real numbers. Set

$$M(x) = \left(\frac{x_1^2 + x_2^2 + \dots + x_n^2}{n} \right)^{1/2}, x \in \mathbb{R}_+^n,$$

and

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

We call $M(x)$ the rms-power mean of x .

Claim: $\lim_{n \rightarrow \infty} M(x) = M_0(x)$

Examples on Page 69

2) Define

$$V_n = \begin{pmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_2 & x_3 & \dots & x_n \\ x_1^2 & x_2^2 & x_3^2 & \dots & x_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \dots & x_n^{n-1} \end{pmatrix}$$

We call V_n the Vandermonde matrix of order n .

Claim: $\det V_n = \prod_{1 \leq i < j \leq n} (x_j - x_i)$

Q4 Make the following equations

- $x^2 + x^2 + x^2 = 3x^2$
- $\sqrt{100} = 10$
- $(a+3)^2 = a^2 + 3a^2 + 3a^2 + 9$
- $\sum_{k=1}^n \frac{k(k+1)}{2}$
- $\frac{1}{4} - \frac{1}{5} + \frac{1}{6} - \frac{1}{7} + \dots$

Q4 make the following equations

- $\cos \theta = \sin(\theta - \pi)$

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- File icons

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148 \begin{frame}{Q7. Make the following multi line equations }
149 \begin{eqnarray*}
150 \tan(\alpha+\beta+\gamma)&=&\frac{\tan(\alpha+\beta)+\tan\gamma}{1-\tan(\alpha+\beta)\tan\gamma} \\
151 &=&\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} \\
152 &=&\frac{\tan\alpha+\tan\beta+(1-\tan\alpha\tan\beta)\tan\gamma}{1-\tan\alpha\tan\beta-(\tan\alpha+\tan\beta)\tan\gamma} \\
153 &=&\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} \\
154 \end{eqnarray*}
155 \end{frame}
156
157 \begin{frame}{Q7. Make the following multi line equations }
158 \begin{eqnarray*}
159 \prod_p \left(1-\frac{1}{p^2}\right) &=& \prod_p \frac{1}{1+\frac{1}{p^2}+\frac{1}{p^4}+\dots} \\
160 &=& \left(\prod_p \left(1+\frac{1}{p^2}+\frac{1}{p^4}+\dots\right)\right)^{-1} \\
161 &=& \left(1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\dots\right)^{-1} \\
162 &=& \frac{6}{\pi^2} \\
163 \end{eqnarray*}
164 \end{frame}
165
166 \begin{frame}
167 \begin{center}
168 \underline{\Huge\emph{THANK YOU!}}
169 \end{center}
170 \end{frame}
171 \end{document}
172

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KUMAR UNIVERSITY DELHI

Examples on Page 69

1) Let (x_1, x_2, \dots, x_n) where the x_i are non-negative real numbers. Set

$$M(x) = \left(\frac{x_1^2 + x_2^2 + \dots + x_n^2}{n}\right)^{1/2}, x \in \mathbb{R}^n_+$$

and

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

We call $M(x)$ the rth power mean of x .

Claim: $\lim_{r \rightarrow \infty} M_r(x) = M_0(x)$

Examples on Page 69

2) Define

$$V_n = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ x_1 & x_2 & x_3 & \dots & x_n \\ x_1^2 & x_2^2 & x_3^2 & \dots & x_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \dots & x_n^{n-1} \end{bmatrix}$$

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Q4 Make the following equations

- $x^2 + x^2 + x^2 = 3x^2$
- $\sqrt{100} = 10$
- $(a+b)^2 = a^2 + 2ab + b^2$
- $\sum_{k=1}^n \frac{k(k+1)}{2}$
- $\frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \frac{1}{5} + \dots$

Q4 make the following equations

- $\cos \theta = \sin(\theta + \pi/2)$