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Date: 8/4/2020

1st Lectur

MATH

Real Number System:

$N = \{1, 2, 3, \dots\}$ $\quad x+2=2$

$W = \{0, 1, 2, 3, \dots\}$ $\quad x+2=-2$

$Z = \{0, \pm 1, \pm 2, \pm 3, \dots\}$ $\quad 3x=2,\ x=\frac{2}{3}$

Set of Q OR Rational Number $= \left\{\frac{P}{q}, P, q \in Z\right\}$

Set of irrational Number $Q' = \left\{x \neq \frac{P}{q}, P, q \in Z\right\}$

$x^2+1=0$

$(\sqrt{-1})^2+1=0$

$-1+1=0,\ 0=0$

$x=\sqrt{-1}=i$

Set of IR OR real Number $= \{Q \cup Q'\}$

Imagainery Number:

A Number

Which can be called imagainery written in form of $a+bi$ $a, b \in R$ Number is called Complex Number Where

$i=\sqrt{-1}$

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Set:

A collection of dissting object is called Set

Example:

$\{1, 2, 3, \ldots, 10\}$

Union = $\cup$ $A \cup B$

Intsection = $\cap$ $A \cap B$

difference /or $A \setminus B$

Matrix:

A Squar or rectungullar ary of Number is called matrix

Example = $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Recturgular matrix:

When Number of raw are not equal to Number of colum is called Rectungular matrix

$$\begin{bmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \end{bmatrix}$$

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Squar Matrix:

When Number of row are equal to Number of caulm is called Squar matrix

$$\begin{bmatrix} 6 & 7 \\ 3 & 6 \end{bmatrix}$$

Row matrix:

if there is only one row is called row matrix

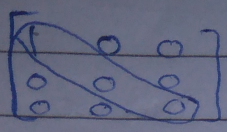
$$\begin{bmatrix} 2 & 3 \end{bmatrix}$$

Colum matrix:

if there is only one caulm is called colum matrix.

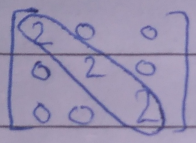
Diagnol matrix:

if in diagnol of any matrix one word is non-zero is called Diagnol



Sclar matrix:

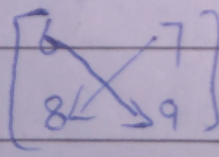
Any matrix in diagnd all words are non-zero is called Sclar matrix

= 

Identity matrix:

Any matrix in diagnd all word are one is called Identity.

Determinte of matrix:

 = 54-56=-2

$ad - bc = 0$

$|A| = 0$ Singular

$|A| \neq 0$ Non-Singular

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|A| equal Zero is called Singular
|A| not equal to Zero is called Non-Singular

Invers of matrix:

$$A^{-1} = \frac{Adj A}{|A|}$$

Example

$$A = \begin{bmatrix} 6 & -1 \\ 7 & -2 \end{bmatrix}$$

$$adj\ A = \begin{bmatrix} -2 & 7 \\ -1 & 6 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 6 & -1 \\ 7 & -2 \end{vmatrix}$$

$$= (-12) - (-7)$$

$$= -12 + 7$$

$$= -5$$

$$A^{-1} = \frac{Adj A}{|A|} = \frac{\begin{bmatrix} -2 & 1 \\ -7 & 6 \end{bmatrix}}{5}$$

$$= \begin{bmatrix} -2/5 & 1/5 \\ -7/5 & 6/5 \end{bmatrix}$$

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Liner equaction:

$5x^2+6x=6 \Rightarrow$ liner equaction in variable x

$5x+6y=7$ liner equaction in variabel x and y

$$\left.\begin{matrix} 5x+7y=6 \\ 5x+6y=7 \end{matrix}\right\} \Rightarrow \text{System of liner equaction}$$

Solution:

Cramer Rule

$$x=\frac{|Ax|}{|A|}, \quad y=\frac{|Ay|}{|A|}$$

$$A=\begin{vmatrix} 5 & 7 \\ 5 & 6 \end{vmatrix} \Rightarrow |A| = 30-35=-5$$

$$Ax=\begin{vmatrix} 2 & 7 \\ 7 & 6 \end{vmatrix} \Rightarrow |Ax| = 12-49=-37$$

$$Ay=\begin{vmatrix} 5 & 2 \\ 5 & 7 \end{vmatrix} = Ay = 35-10=25$$

$$x=\frac{-37}{-5}=\frac{37}{5}$$

$$y=\frac{25}{-5}=-5$$

Liner equaction:

Liner equaction is a equaction whose degree is one.

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Quardatic equaction:

Quardatic equaction is a equaction whose is total.

Quardatic equaction:

$ax^2+bx+c=0$

$ax^2+5x+6=0$

1. Factorization method
2. Completing Squar
3. quardatic Squar

$$x=\frac{-b+\sqrt{b^2-4ac}}{2a}$$

Method No: 1

$x^2+2x+1=0$

$x^2+1x+1x+1=0$

$x(x+1)+1(x+1)=0$

$(x+1)(x+1)=0$

$x+1=0$ $\quad x+1=0$

$x=-1$ $\quad x=-1$

S.Set $=\{-1,-1\}$

Method: 2

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(1)}}{2(1)}$

$x = \frac{-2 \pm \sqrt{4-4}}{2} \quad \frac{-2+\sqrt{0}}{2} = \frac{-2+0}{2} \quad \frac{-2-0}{2}$

$\frac{-2}{2} \quad \frac{2}{2}$

$-1 \quad -1$

S.Set $= \{-1, -1\}$

Completing Square:

$x^2 + 4x + 1 = 0$

$x^2 + 4x = -1$

$x^2 + 4x + (2)^2 = -1 + (2)^2$

$(x+2)^2 = -1 + 4$

$(x+2)^2 = 3$

Taking Square on both Side

$\sqrt{(x+2)^2} = \sqrt{3}$

$x + 2 = \pm\sqrt{3}$

$x = -2 - \sqrt{3} \qquad x = -2 + \sqrt{3}$

$x = -2 - \sqrt{3} \qquad x = -2 + \sqrt{3}$

2nd Lectur

Sequence and Series

Arithmetic Sequence:

Sequence is a function whose domain is set of natural number.

$f(x) = x^2$

$f(n) = n^2$

$f(1) = 1$

$f(2) = 2$

$f(3) = 3$

Arithmetic Sequence

If $\{a_1, a_2, a_3, \ldots a_{n+1}, a_n, \ldots\}$

$d = a_n - a_{n-1}$ called common difference

$\{1, 4, 9, 6, 25, \ldots\}$

$d = a_n - a_{n-1}$ Same for all term

the Sequence is called arithmetic Sequence.

Arithmetic Sequence is a Sequence in which the Sequnce of all

is Same.

Example

$\{2, 4, 6, \ldots\}$

Asithmetic Sequence is called arithmetic Progresstion.

Series Show as

$S_n = \{2, 4, 6, \ldots\}$

$\{a_n\} = \{2, 4, 6, \ldots\}$

Geometric Sequence/Progresstion/G.P

$\{a_1, a_2, a_3, \ldots a_n, a_{n+1}\}$

$r = \frac{a_n}{a_{n-1}}$ Same for all term

Sequence is called G.P

$\{3, 6, 9, \ldots\}$

$r = \frac{6}{3} = 3$

$r = \frac{12}{6} = 2$ called common

ration

Harmonic Progresstion/H.P/Sequence

The reciprocal of term of arithmetic Sequence is called Harmonic Progresstion.

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Example

$\{2, 4, 6, 8, \ldots\} \Rightarrow$ A.P

$\{An\} = \{\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \ldots\} \Rightarrow$ H.P

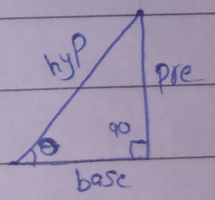
$\{Sn\} = \{\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \frac{1}{8}, \ldots\}$ Harmonic Series.

Tignometry

Tri + Goni + metry

Three angels measurment

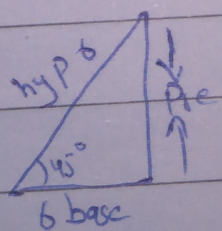
The measurment of angle triangles is called Tignometry.



$\sin\theta = \frac{Pre}{hyp} \Rightarrow \operatorname{Cosec}\theta = \frac{hyp}{base}$

$\cos\theta = \frac{base}{hyp} \Rightarrow \sec\theta = \frac{hyp}{base}$

$\tan\theta = \frac{base}{hyp} \Rightarrow \cot\theta = \frac{base}{hyp}$



$\sin\theta = \frac{Pre}{hyp}$

$\sin\theta = \frac{x}{6}$

$\sin(45^\circ) = \frac{1}{\sqrt{2}} = \frac{x}{6}$

$x = 3\sqrt{2}$

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Natus of Roots

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$b^2-4ac=0$ discreminet

$b^2-4ac=0 \Rightarrow$ repeted and Real $x = \frac{-b}{2a}$ to

$b^2-4ac<0 \Rightarrow$ Roots will be Imagenry $x = \frac{-b}{2a}, \frac{-b}{2a}$

$b^2-4ac>0 \Rightarrow$ roots will be real and rational

For Example:

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

$a=3,\ b=4,\ c=5$

$b^2-4ac=0$

$(4)^2-4(3)(5)=0$

$-44=0$

Roots will be Imagenry

(i) $3x^2+6x+6=0$

$a=3,\ b=6,\ c=6$

$b^2-4ac=0$

$(6)^2-4(3)(6)=0$

$36-72=0$

$36=0$

roots will be real and rational

Solution. $f'(x) = \frac{1}{12}(4x^3) - \frac{1}{6}(3x^2) \cdot 4$

$\frac{1}{3}(3x^2) + \frac{1}{2}(2x) + \frac{1}{2}(1) + 0 = x^2 - x + \frac{1}{2}$

(12)

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$-3x^2+5x+6=0$

$a=-3,\ b=5,\ c=6$

$b^2-4ac=0$

$(5)^2-4(-3)(6)=0$

$25+72=0$

$97=0$

Roots will be real and Imagenry.

$x^2+6x=0$

Pure quardatic eqvaction.

3rd Lectur

Friday

MATHMATIC II

Realline

We take difference of unit Real Number System then if there Next real Number is called real line Number

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Real line

We take difference of unit Real Number System The line that generates the line number for this line is called Real line.

$x \geq 2 \Rightarrow [2, \infty]$

$x \leq -1 \Rightarrow (-\infty, -1)$

Function:

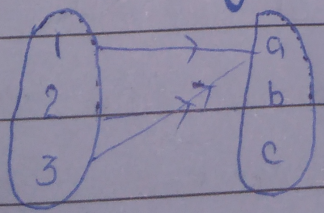
Function is machine in which we give possible Input and obtain possible output.

Function is a rule throught which Can Connect each element of Set A to unique element of Set B

Example:

$A = \{1, 2, 3\}$, $B = \{a, b, c\}$

Vain Diagram:



Solution. $f'(x) = \frac{1}{12}(4x)$ 6

$f''(x) = \frac{1}{3}(3x^2) - \frac{1}{2}(2x) + \frac{1}{2}(1) + 0 = x^2 - x + \frac{1}{2}$

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$A \times B = \{(1,a)(1,b)(1,c),(2,a),(2,b),(2,c)$
$(3,a),(3,b),(3,c)\}$

Relationship of Set

$7 = \{(1,a),(3,a)(2,b)\}$

$7 \subset A \times B$

Domain $7 = \{1,3,2\}$

First element of order pair is domain

Range: $7 = \{a,b\}$

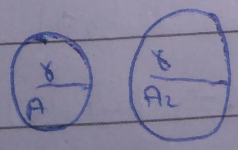
Second element of order pair is called Range

Function satisfy two condition:

Domain of $7 = \{1,2,3\} = A$

There is No Repeation in first element of order Pair

So 7 is called Function.



$A(\delta)$

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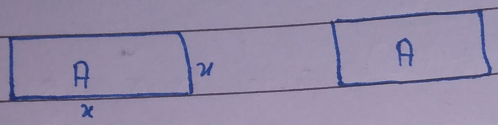
Area is the function of Radius

A(r) → Idepended Quentity

↙ depended Quentity

Domain A(r) Range



$A = r \times r$

$A = r^2$ → Independ variable

↓

Dependend variable

Graph of function:

$f(x) = x^2$

$x = 0, 1, 2, 3, 4$ $\quad x = 0, -1, -2, -3, -4$

$f(0) = 0 \Rightarrow (0, 0)$ $\quad f(0) = 0 \Rightarrow (0, 0)$

$f(1) = 1 \Rightarrow (1, 1)$ $\quad f(-1) = -1 \Rightarrow (-1, 1)$

$f(2) = 4 \Rightarrow (2, 4)$ $\quad f(-2) = 4 \Rightarrow (-1, 4)$

$f(3) = 9 \Rightarrow (3, 9)$ $\quad f(-3) = 9 \Rightarrow (-3, 9)$

$f(4) = 16 \Rightarrow (4, 16)$ $\quad f(-4) \Rightarrow 16 \Rightarrow (-4, 16)$