Lecture # 1

26 March — Numerical Computing

Numerical Method

MATLAB 2020 (octave)

error Analysis

Inverse

A

* Ignite
* BER-

A- $\bar{A}$. $\bar{B}$ AB

A =

Number System:-

(23) - (10111)

2	23
2	11 — 1
2	5 — 1
2	2 — 1
	1 — 0

20 ( ) 2

128 64 32 16 8 4 2 1

1 1 1 1 1 1 1 1

1 0 1 0 0

23 . ( )

128 64 32 16 8 4 2 1

1 1 1 1 1 1 1 1

3rd class. 2 April Lecture #2

Date: M T W T F S S

(Numerical Computing)

Octave ⟷ Software

Why we use numerical computing / Method

To Slove Problam that can not be Solved Difficult to find their analytical Solution.

Example : $\int_0^1 e^{x^2} \cdot dx$ = 0 (power of 'e' in not inside the interigal)

- NoN - liner equation :-

* Solution of NoN Linear equation.

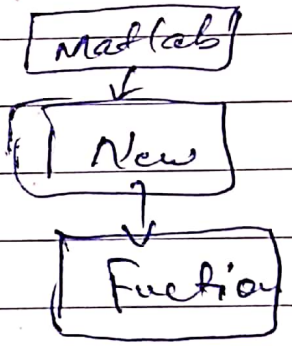
Bi Section Method

Function [A] = area of Sq (x)

(A → Area, x → num. size)

A = x * x ;

end



< % Comments Sign >

Command Line ↓

fx >> area = area of Sq(5)

A. >> area of Sq (5)

ans = 25

% Area of Sq

File extension .m

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Function [A] = area of rec (L, W)

```
A = l * w;      # formula area of rec
end
```

Now example of Area of Rectangle

⇒ As we know Rectangular have 2 input variable.

Command Line

```
x = 5;    % length
y = 7;    % width
Area = area of rec (x, y)
```

```
x = 5
y = 7
Area = 35
```

file name (area of rec.m)

Now we make a fuction takes one input variable & two outputs.

function [A1, A2] = area of rec (l, w)

```
A1 = l * w;    % of Rec
A2 =
```

1/180 area1.mm -> Filename.

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=> Suppose we have write both (area of Circle & area of Square)

Function [A1, A2] = area1(x)(

A1 = pi * x^2 ; (area of circle)

A2 = x * x ; (area of sq)

end

Command line:

[Area1 Area2] = area1(6)

Q4:- %Now instead of command window, we use Script file for this I will make two new fuctions like we have same first function. and third is for area of circle

x = input ("enter Side of Square");

y = input ("enter another sid of Square");

r = input ("enter radious of Circle");

disp('Its area of Square is:')

% Now call the function

Ctrl F9 evalute.

Date:
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Area1 = area of sq (x)

disp ('This area of rec is :')

Area 2 = area of rec (x,y)

disp ('Area of circle')

Area 3 = area 2 (r)

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Bisection:- Lecture #3

① Non Linear:-
$f(x) = 0$ where $f(x)$ is non.

② Non Linear Algebric Eq ;

① $x^3 - 3x^2 + 5x + 1 = 0 \rightarrow$ x's power is other then 1

② $x^4 - 4x^2 + 6x = 0$

③ Non-Linear Transcendental equation.

- $e^x - \sin(x) = 0$
- $e^x - \sin(x^2) = \tan(x)$
- $e^x - \cos(x)$
- $\sin(x) - \log_{10}(2x) = 4$

④ Solution of Non Linear
① Bisection
② Newton's Method
③ Secant Method

Date:

④ Regular Falsi Method

⑤ Fixed Point Method

(Bisect (ﺑﻴﭻ)) Bisection Method

* Bisection Method is straight forword method used to find numerical solution of an equation with one unKNown veriable this is called Interval halving method or Binary Method or Dichotomy method

* Basically this is Root finding method (it apply to any Continous function with two Know values of opposit signs).

* In short Bisection Method : Bar Bar (Root Bracking criteria). lagaty rehna untill hum Root tak Pohunch jain.
(means value of function will b "0").

* So what is Root Bracking Criteria:

• ~~Interval value~~ Intermediate value Theorem

$f(a) \cdot f(b) < 0$ (opposite Sings)

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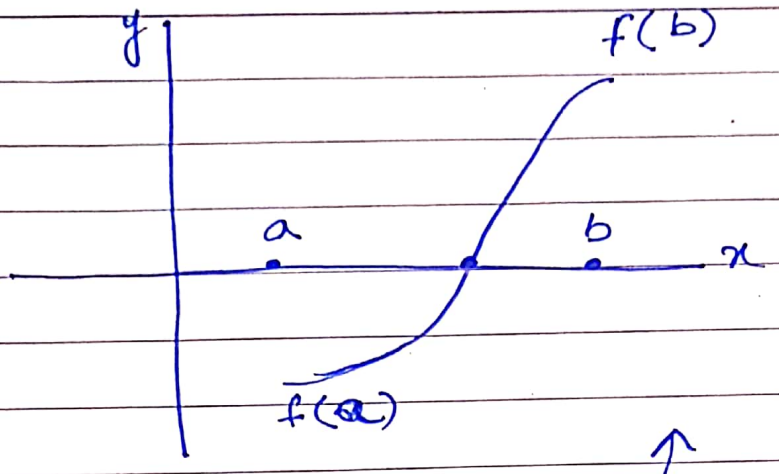
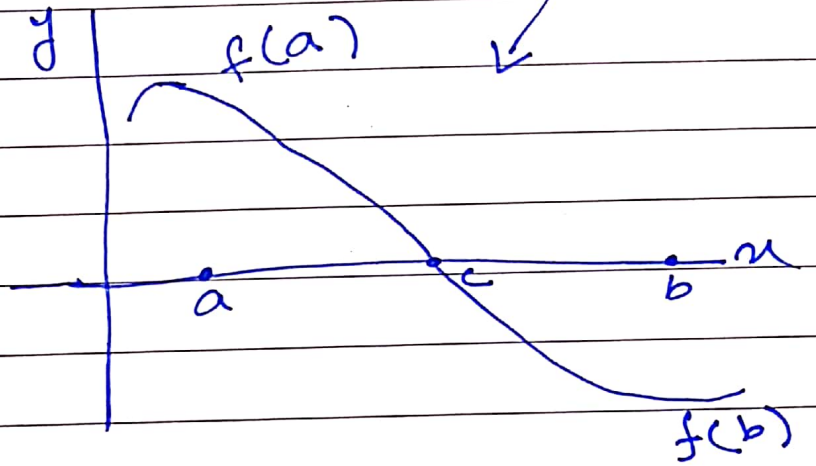
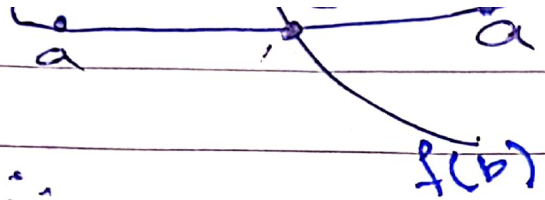


Then root lies b/w a & b





expression :

$f(a) \cdot f(b) < 0 \Rightarrow$ opposit signal ~~opposition signal~~

Find a root of function.

$x^3 - 4x - 9 = 0$

$f(0) = 0 - 0 - 9 = 0 = -9$

$f(1) = (1)^3 - 4(1) - 9 = 0 \Rightarrow -12$

$f(2) = -9$

$f(3) = +6$