# Department of Computing

# MATH 333: Numerical Analysis

# Class: BESE-12

# Lab 4: Newton Raphson Method

# Date: Feb 18, 2022

# Lab 4: Newton Raphson Method

**Introduction**

Newton Raphson method is a numerical method. Newton Raphson method allows us to find the roots of functions.

**Objectives**

The purpose of this lab is to get familiar with Newton Raphson Method

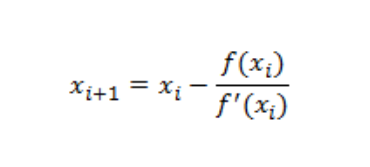
**Tools/Software Requirement**

Matlab R2016a

**Description**

For Newton Raphson method, the function must be differentiable. The formula for Newton

Raphson method is :



**Main Steps**

* 1. Check if the given function is differentiable or not. If the function is not differentiable, Newton’s method cannot be applied.
  2. Find the first derivative f’(x) of the given function f(x).
  3. Take an initial guess root of the function, say x1.
  4. Use Newton’s iteration formula to get new better approximate of the root, say x2x2 = x1 – f(x1)/f’(x1)
  5. Repeat the process for x3, x4… till the actual root of the function is obtained, fulfilling the tolerance of error.

**% Program Code of Newton-Raphson Method in MATLAB**

a=input('Enter the function in the form of variable x:','s');

x(1)=input('Enter Initial Guess:');

error=input('Enter allowed Error:');

f=inline(a)

dif=diff(sym(a));

d=inline(dif);

for i=1:100

(compute (x(i+1)), which is the value of root using the formula,

note that the value of differential is stored in d.

then compute err(i), which is the value of error

write if check to compare it with tolerance error value and  
break if the value is less than error.)

end

root=x(i)

**Lab Task**

Implement Newton Raphson method as function. Take function, initial guess and tolerance as input from user. Calculate its derivative and find its roots.

Note: For derivative, investigate “sym” and “diff” command.

**Deliverables**

Submit single word file with matlab code and screen shot of Output.

## Solution

## Code:

function [root] = bisect()

a=input('Enter function: ');

f=inline(a);

xl=input('Enter lower guess: ') ;

xu=input('Enter upper guess: ');

tol=input('Enter tolerance(recommended 0.001): ');

if f(xu)\*f(xl)<0

else

fprintf('Wrong Guess! Enter new guess\n');

xl=input('Enter lower guess: ') ;

xu=input('Enter upper guess: ');

end

xnew(1)=0;

for i=2:1000

xr = (xl + xu)/2;

if f(xu)\*f(xr) < 0

xl = xr;

else

xu = xr;

end

xnew(i)=xr;

if abs(f(xnew(i)))<tol,break,end

end

root = xr;

disp([;'The required root of the equation is ' num2str(xr) '.']);

end

## Screenshots:

Graphical user interface, text, application

Description automatically generated

Graphical user interface, text, application

Description automatically generated