

Main Code:

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%This script M-File is to show a comparison between the Newton_Raphson  
%method and the direct iterative method. refer to Ex5.1, Pb5.3, Pb5.4  
%this script uses two function M-file: fct_pb5_3 and dfct_pb5_3.  
%the first one is the function under consideration that we are looking  
%for its roots  $f(x)=x-\sin(x)-1$  and the second is its derivative  
% $f'(x)=1-\cos(x)$ ;  
  
clear all;  
  
%Newton-Raphson Method  
Error=1e5; %very large number to make sure we enter the while loop  
  
%define the xguess. the starting value for x.  
xguess_NR=1; %make sure this value of xguess doesn't give  $f'(xguess)=0$   
x_NR(1)=xguess_NR;  
k_NR=1; %since we already defined x(1). we should start with k=2.  
  
%Always we have at start the condition  $Error > 1e-5$   
while Error > 1e-5  
    x_NR(k_NR+1)=x_NR(k_NR)-fct_pb5_3(x_NR(k_NR))/dfct_pb5_3(x_NR(k_NR));  
    Error=abs(x_NR(k_NR+1)-x_NR(k_NR));  
    k_NR=k_NR+1;  
end  
%at the end of this routine k_NR is the number of iterations for  
%the Newton-Raphson Method and x_NR is the values of the root  
%at every iteration.  
  
%Direct Iterative Method  
%we follow the same procedure we used for Newton-Raphson Method  
Error=1e5; %very large number to make sure we enter the while loop  
xguess_D=1;  
x_D(1)=xguess_D;  
k_D=1;  
while Error > 1e-5  
    x_D(k_D+1)=sin(x_D(k_D))+1;  
    Error=abs(x_D(k_D+1)-x_D(k_D));  
    k_D=k_D+1;  
end  
%at the end of this routine k_D is the number of iterations for  
%the Direct Iterative Method and x_D is the values of the root  
%at every iteration.
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%plot root at each iteration for both methods.
plot(x_NR,'r*:')
hold on;
plot(x_D,'b+:')
title('Homework 4');
xlabel('Iteration number')
ylabel('root value at each iteration')
legend('N-R Method','Direct Method')
grid;

```

Used Functions (Each is a separate Function M-File):

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%the derivative function f'(x)=1-cos(x)
function dy=dfct_pb5_3(x)
dy=1-cos(x);
%the function under consideration f(x)=x-sin(x)-1
function y=fct_pb5_3(x)
y=x-sin(x)-1;

```

Graph:

