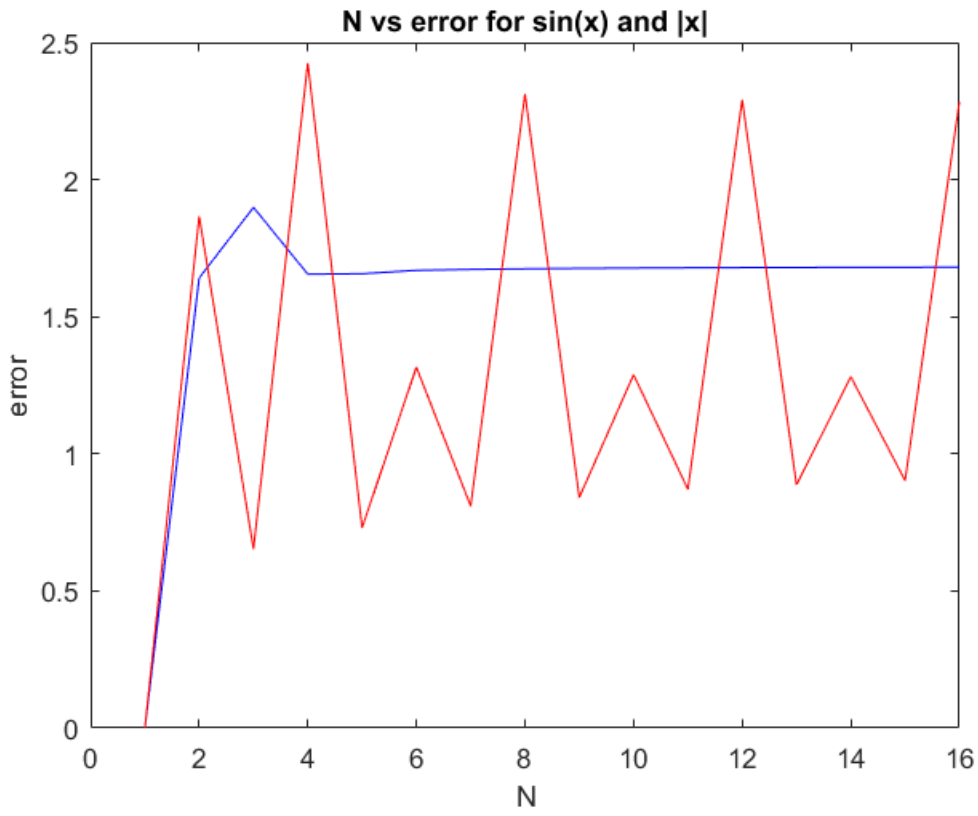
```
% Problem 4
close all
clear
clc
format long e
fun1 = @ (x) sin(x);
fun2 = @ (x) abs(x);

x_values = 1:0.00001:1;
n = 1:16;

for i = 1 : length(n)
    for j = 1 : n(i)
        x(j) = cos((2*j+1)*pi/(2*n(i)+2));
    end
    y_actual1 = fun1(x);
    y_actual2 = fun2(x);
    y_inter1 = lagrange(x_values,x,y_actual1,n(i));
    y_inter2 = lagrange(x_values,x,y_actual2,n(i));
    error_1 = abs(y_actual1 - y_inter1);
    error_2 = abs(y_actual2 - y_inter2);
    % calculating maximum error for given n
    error_fun1(i) = max(error_1);
    error_fun2(i) = max(error_2);

end
% tabulating maximum error for each N
format long
T_N = table;
T_N.N = n';
T_N.function1_error = error_fun1';
T_N.function2_error = error_fun2'

% plotting N, to see its behaviour
plot(n,error_fun1,'b')
hold on
plot(n,error_fun2,'r')

xlabel('N')
ylabel('error')
title('N vs error for sin(x) and |x|')
```

```
T_N =

    N     function1_error      function2_error
    __    _________________    _________________

     1                    0                    0
     2    1.64136464207345     1.86602540378444
     3    1.89871012697547    0.653281482438188
     4    1.65500706606126     2.42490841445406
```

```
 5    1.65667880343396    0.730223565893552
 6    1.66913540114642     1.31578485505832
 7    1.67248395651066    0.809602838977899
 8    1.67463676311674     2.31194843176127
 9    1.67622591940819    0.841142303869194
10    1.67739897707585     1.28825834353655
11    1.67828887266689    0.870883238360663
12    1.67898022596482     2.29099139342371
13    1.67952805023365    0.887145082505436
14    1.67996952577034     1.28096040952881
15    1.68033052087267    0.902580685515231
16    1.68062948600372     2.28344597990918
```



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