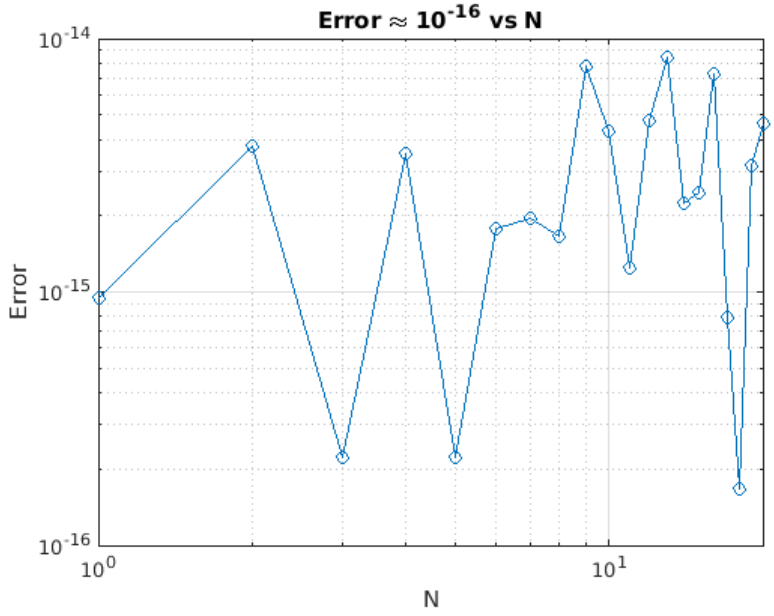
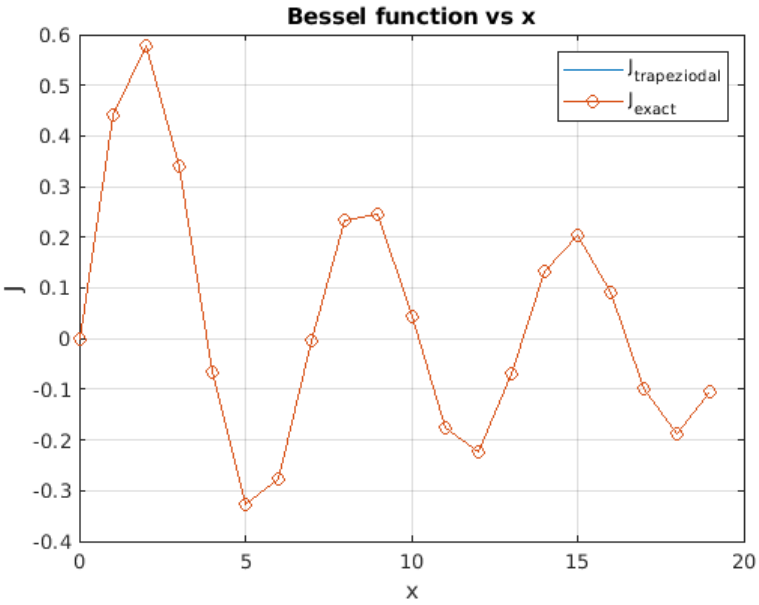
```
clear all;
close all;

J =@(x,t) 1/pi*cos(t -x*sin(t));

N = 20; h = 20/N;  a=0; b=pi; n = 1e6; h1 = (b-a)/n;
t = linspace(0,pi,n+1);

x = [];
T = [];
for i = 0:19
    x1 = i*h;
    x = [x,x1];
end

for i = 1:20
     %trapezoidal rule
    T1 = (h1/2)*(J(x(i),t(1))+2*sum(J(x(i),t(2:n)))+J(x(i),t(end)));
    T = [T,T1];
end

%exact
J1=besselj(1,x);
error = abs(J1 - T);

%table
N = [1:20]';
Table = table(N(:),error(:),'VariableNames',{'N','Error'})

fprintf('Hence error values are approximately 10^-16');

%convergence
fprintf('Exponential convergence, due to the fact that we are dealing with a periodic integral');

figure(1)
loglog(N,error, '-o'); grid on
xlabel('N');ylabel('Error');
title('Error \approx 10^-^1^6 vs N');

figure(2)
plot(x,T); grid on
xlabel('x');ylabel('J');
title('Bessel function vs x');
hold on
plot(x,J1,'-o');
legend('J_t_r_a_p_e_z_i_o_d_a_l','J_e_x_a_c_t')
```

```
Table =

  20×2 table

    N       Error
    __    __________

     1    9.4459e-16
     2    3.7748e-15
     3    2.2204e-16
     4    3.4972e-15
     5    2.2204e-16
     6    1.7764e-15
     7    1.9429e-15
     8    1.6575e-15
     9    7.7438e-15
    10    4.3299e-15
    11    1.2421e-15
    12    4.7462e-15
    13    8.4099e-15
    14    2.2343e-15
    15    2.4702e-15
    16    7.2442e-15
    17    7.9103e-16
    18    1.6653e-16
    19    3.1641e-15
    20    4.6213e-15

Hence error values are approximately 10^-16Exponential convergence, due to the fact that we are dealing with a periodic integral
```





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