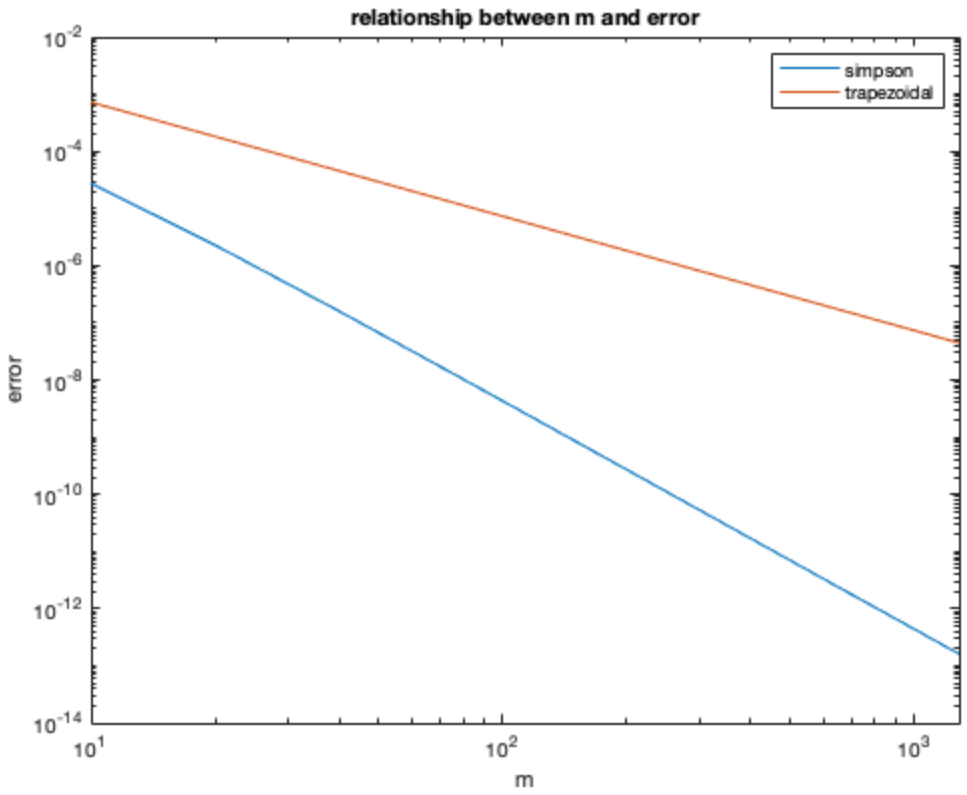
```
close all

f=@(x) sqrt(x);

%upper and lower limit
a=0.1;
b=1;
%Function for exact integration value
f_val=integral(f,a,b);


n=[10 20 40 80 160 320 640 1280];


fprintf('\t m \t Trap \t\t Simpson \t\t ErrorTrap \t ErrorSimpson\n')
% calculate values by using the rules
% part (a)
for i=1:length(n)
    m(i)=n(i);
    valTrap=trapez(f,a,b,m(i));
    valSimp=simpson(f,a,b,m(i));


    %errors
    errTrap(i)=abs(f_val-valTrap);
    errSimp(i)=abs(f_val-valSimp);

    fprintf('\t%d\t%f\t%f\t%e\t%e
\n',m(i),valTrap,valSimp,errTrap(i),errSimp(i))
end


% plot of error
% using the logarithmic style according to the prompt
% part (b)
loglog(m,errSimp)
hold on
loglog(m,errTrap)

xlabel('m')
ylabel('error')
title('relationship between m and error')
legend('simpson','trapezoidal')

% least square
% x
mTrap=log(m);
% y
eTrap=log(errTrap);
pp=polyfit(mTrap,eTrap,1);
kTrap=pp(1);
DTrap=pp(2);
```

```
% print k and D under trapezoidal rule
display(kTrap);
display(DTrap);

mSimp=log(m);
eSimp=log(errSimp);
pp=polyfit(mSimp,eSimp,1);
kSimp=pp(1);
DSimp=pp(2);

% print k and D under Simpson rule
display(kSimp);
display(DSimp);
```

```
function val=trapez(f,a,b,n)
    val=0;
    interval=linspace(a,b,n+1);

    h = (b-a)/n;

        for i=2:length(interval)-1
            xi=interval(i);
            val=val+h*(f(xi));
        end
       val=val+h*(0.5*(f(interval(1)))+0.5*(f(interval(end))));
end


function val=simpson(f,a,b,n)
    interval=linspace(a,b,n+1);

    h=(b-a)/n;

    val=(h/3)*((f(interval(1)))+(f(interval(end))));

        for i=2:length(interval)-1
            xi=interval(i);
            if mod(i,2)==0
                val=val+(h/3)*4*(f(xi));
            else
                val=val+(h/3)*2*(f(xi));

            end
        end
end
```

```
  m    Trap     Simpson     ErrorTrap    ErrorSimpson
 10 0.644865 0.645557 7.203050e-04 2.760751e-05
 20 0.645403 0.645583 1.817945e-04 2.291023e-06
```

```
 40 0.645539 0.645585 4.556890e-05 1.603630e-07
 80 0.645573 0.645585 1.140001e-05 1.038465e-08
 160 0.645582 0.645585 2.850495e-06 6.553103e-10
 320 0.645584 0.645585 7.126545e-07 4.105749e-11
 640 0.645585 0.645585 1.781655e-07 2.567502e-12
 1280 0.645585 0.645585 4.454151e-08 1.616485e-13

kTrap =

   -1.9981


DTrap =

   -2.6289


kSimp =

   -3.9292


DSimp =

   -1.2601
```



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