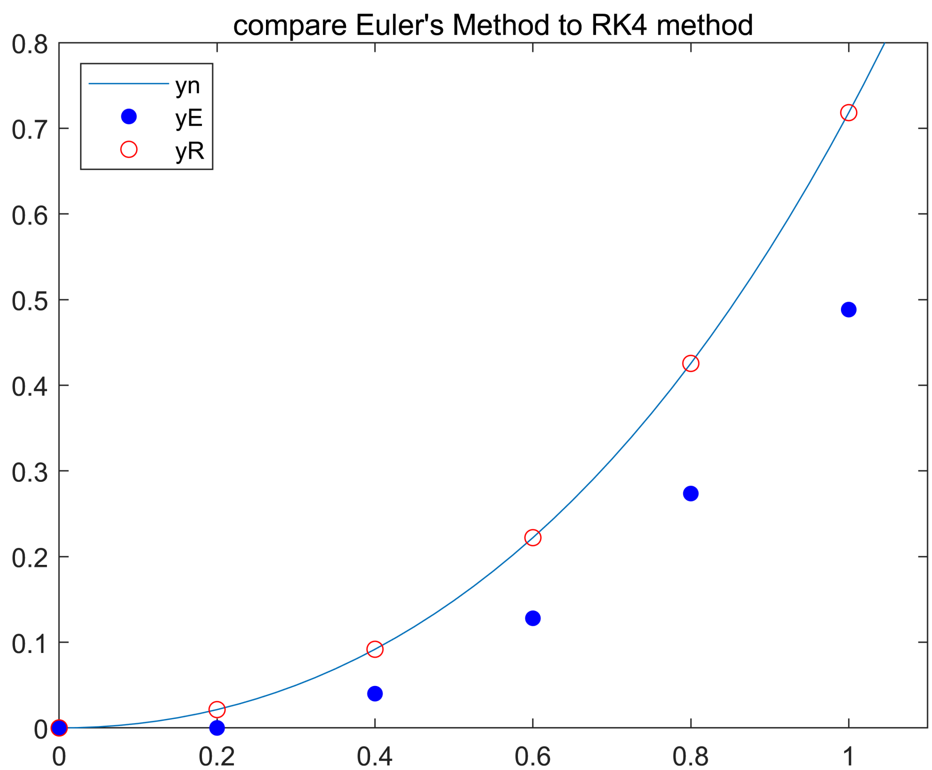
```
clear
%solution of y
syms y(x)
deq=diff(y,x)==f(x,y); %y'=y+x
cond=y(0)==0; %y(0)=0
ySol(x)=dsolve(deq,cond);

%given-values
n=(0:5)';
h=0.2;
%x-values
x=(h*n(1):h:h*n(end))';
%y-values
yn=double(ySol(x)); % actual values

%Euler's Method
for m=1:length(n)
    if m==1
        yE(m)=0;
    else
        yE(m)=yE(m-1)+h*(yE(m-1)+x(m-1));
    end
end
yE=yE'; %approximate values with Euler's Method

%RK4 Method
for m=1:length(n)
    if m==1
        yR(m)=0;
        k1(m)=f(x(m),yR(m));
        k2(m)=f(x(m)+h/2,yR(m)+h/2*k1(m));
        k3(m)=f(x(m)+h/2,yR(m)+h/2*k2(m));
        k4(m)=f(x(m)+h,yR(m)+h*k3(m));
        ks=k1+2*k2+2*k3+k4;
    else
        yR(m)=yR(m-1)+h/6*ks(m-1);
        k1(m)=f(x(m),yR(m));
        k2(m)=f(x(m)+h/2,yR(m)+h/2*k1(m));
        k3(m)=f(x(m)+h/2,yR(m)+h/2*k2(m));
        k4(m)=f(x(m)+h,yR(m)+h*k3(m));
        ks=k1+2*k2+2*k3+k4;
    end
end
yR=yR'; % approximate values with Runge-Kutta Method

%errors=difference between actual values and approximate values
errorE=yn-yE; %error with Euler's Method
errorR=yn-yR; %error with Runge-Kutta Method

%plot
fplot(ySol)
hold on
plot(x,yE,'b.','Markersize',20)
```

Jun Hyeok

```
hold on
plot(x,yR,'ro')
xlim([0 1.1])
ylim([0 0.8])
title("compare Euler's Method to RK4 method")
legend({'yn','yE','yR'},'Location',"northwest")
```




```
%table
cmptable=table(n,x,yE,yR,yn,errorE,errorR)
```

cmptable = 6×7 table

	n	x	yE	yR	yn	errorE	errorR
1	0	0	0	0	0	0	0
2	1	0.2000	0	0.0214	0.0214	0.0214	2.7582e-06
3	2	0.4000	0.0400	0.0918	0.0918	0.0518	6.7376e-06
4	3	0.6000	0.1280	0.2221	0.2221	0.0941	1.2344e-05
5	4	0.8000	0.2736	0.4255	0.4255	0.1519	2.0103e-05
6	5	1.0000	0.4883	0.7183	0.7183	0.2300	3.0692e-05

```
function [z]=f(x,y)
z=y+x;
end
```

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