F = @(y)4\*y\*(1-y);

format long

tInitial = 0.0; % Initial time

tFinal = 1.0; % Final time

yInitial = 0.1; % Initial value of y

Eresult = zeros(6,1);

RKresult = zeros(6,1);

%Euler

index = 1;

for h = [0.1, 0.05, 0.025, 0.0125, 0.00625, 0.003125]

N=(tFinal- tInitial)/h;

y = zeros(N+1,1);

t = zeros(N+1,1);

t(1) = tInitial;

y(1) = yInitial;

for i = 1:N

t(i+1) = t(i) + h;

y(i+1) = y(i) + h\*F(y(i));

end

Eresult(index) = y(N+1);

index = index + 1;

end

%RK2 Heum

index = 1;

for h = [0.1, 0.05, 0.025, 0.0125, 0.00625, 0.003125]

N=(tFinal- tInitial)/h;

y = zeros(N+1,1);

t = zeros(N+1,1);

t(1) = tInitial;

y(1) = yInitial;

for i = 1:N

s1 = F(y(i));

s2 = F(y(i)+h\*s1);

t(i+1) = t(i) + h;

y(i+1) = y(i) + h/2\*(s1+s2);

end

RKresult(index) = y(N+1);

index = index + 1;

end

Erate = zeros(4,1);

RKrate = zeros(4,1);

for i = 2:5

Erate(i-1) = log((Eresult(i-1)-Eresult(i))/(Eresult(i)-Eresult(i+1)))/log(2);

end

for i = 2:5

RKrate(i-1) = log((RKresult(i-1)-RKresult(i))/(RKresult(i)-RKresult(i+1)))/log(2);

end

Eresult

RKresult

Erate

RKrate

Eresult =

0.848577688609155

0.854261491392197

0.856526626442711

0.857541767549318

0.858022590427672

0.858256602222059

RKresult =

0.852986409173368

0.857108490469313

0.858140204624536

0.858399561373773

0.858464679344383

0.858481000627705

Erate =

1.327259428394618

1.157916789536809

1.078102830159772

1.038924298864392

RKrate =

1.998329642323363

1.992033497222337

1.993810269330752

1.996301239952911