**Lab Assignment # 4**

1.using MATLAB for the following



a.

f = @(t,y)(y/t)-(y/t)^2;

h = 0.1;

y = 1;

t0 = 1;

tn = 2;

for i=t0 : h: tn-h

y = y + f(i,y)\*h;

i = i + h;

end

disp(y); ans = 1.1707

b.

f = @(t,y) 1+(y/t)+(y/t)^2;

h = 0.2;

y = 0;

t0 = 1;

tn = 3;

for i=t0 : h: tn-h

y = y + f(i,y)\*h;

i = i + h;

end

disp(y); ans = 4.5143

2. Use Runge-Kutta Method to approximate the solutions of each of the following initial value problem using MATLAB for the following



a.

f = @(t,y) (y/t)-(y/t)^2;

h = 0.1;

y = 1;

t0 = 1;

t(1) = t0;

y(1) = y;

tn = 2;

n = (tn-t0)/h

for i=1 : n

t(i+1) = t0 +i\*h;

k1 = h\*f(t(i),y(i));

k2 = h\*f(t(i)+(h/2),y(i)+(k1/2));

k3 = h\*f(t(i)+(h/2),y(i)+(k2/2));

k4 = h\*f(t(i)+h+(h/2),y(i)+(k3));

y(i+1) = y(i)+(1/6)\*(k1+2\*k2+2\*k3+k4);

end

disp(y(n)); ans = 1.1588

b.

f = @(t,y) 1+(y/t)+(y/t)^2;

h = 0.2;

y = 0;

t0 = 1;

t(1) = t0;

y(1) = y;

tn = 3;

n = (tn-t0)/h

for i=1 : n

t(i+1) = t0 +i\*h;

k1 = h\*f(t(i),y(i));

k2 = h\*f(t(i)+(h/2),y(i)+(k1/2));

k3 = h\*f(t(i)+(h/2),y(i)+(k2/2));

k4 = h\*f(t(i)+h+(h/2),y(i)+(k3));

y(i+1) = y(i)+(1/6)\*(k1+2\*k2+2\*k3+k4);

end

disp(y(n)); ans = 4.5143