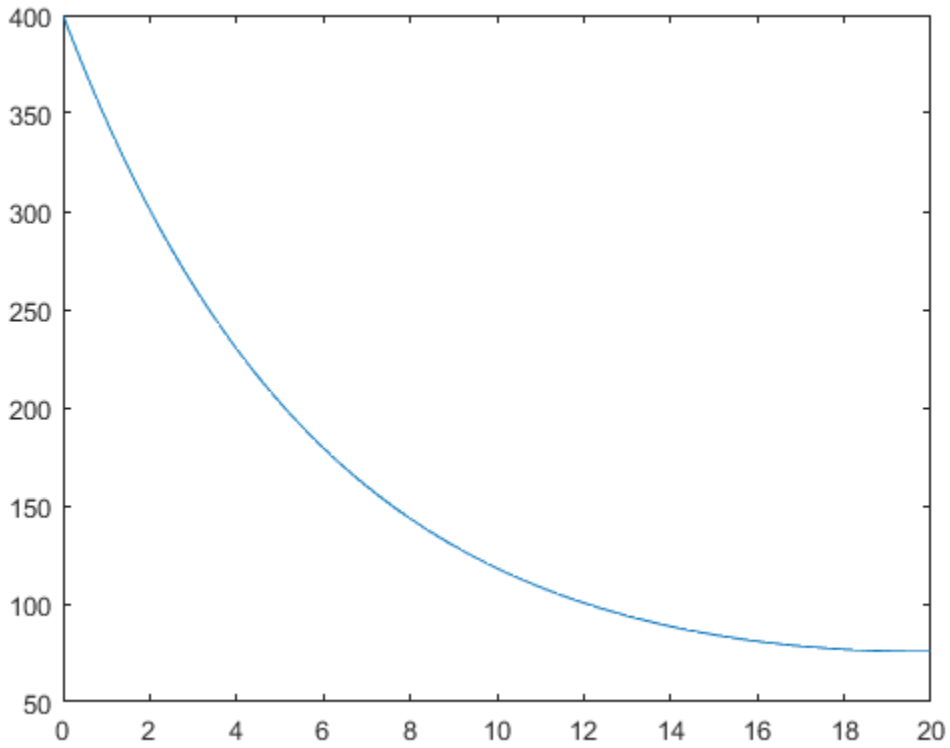
```
function tugas7
%Tugas 7
clear all;clc
%Data
k=0.1;
h=0.0007;
D=1;
Ts=400;
Tu=50;
L=20;
N=101;
eps=0.001;
tol=0.00001;
% Boundaary Condition
% x=0 T=Ts
% x=L dT/dX |x=L = -h/k * (T|x=L - Tu)
%Initial Condition
% Trial dT/dX |x=0
x(1)=0;
T(1)=Ts;

%Persamaan Diferensial
%d^2T/dx^2 - 4h/kD ( T - Tu ) =0
% pemisalan
%dT/dx = Z ,sehingga dZ/dz=d^2T/dx^2  PD menjadi :
%dZ/dx = 4h/kD ( T - Tu )          (1)
%dT/dx = Z                         (2)

% PD (1) dan (2) diselesaikan secara simultan
% Runge Kutta
Zold=0;
er=100;
stepX=(L-0)/(N-1);
while er>tol
    for i=1:N
        Z(1)=runge(Zold);
        x(i+1)=x(i)+stepX;
        %Mencari k1,k2,k3,k4 untuk mencari rata2 slope
        k1h=frk(x(i)        ,Z(i)            ,T(i)            );
        k2h=frk(x(i)+stepX/2,Z(i)+stepX/2*k1h(1),T(i)+stepX/2*k1h(2));
        k3h=frk(x(i)+stepX/2,Z(i)+stepX/2*k2h(1),T(i)+stepX/2*k2h(2));
        k4h=frk(x(i)+stepX  ,Z(i)+stepX  *k3h(1),T(i)+stepX  *k3h(2));
        %Mencari nilai Z dan T step berikutnya
        Z(i+1)=Z(i)+1/6*(k1h(1)+2*k2h(1)+2*k3h(1)+k4h(1))*stepX;
        T(i+1)=T(i)+1/6*(k1h(2)+2*k2h(2)+2*k3h(2)+k4h(2))*stepX;
        b1(i)=Z(i)-h/k*(T(i)-Tu);
        xfinal(i)=x(i);
        Tfinal(i)=T(i);
    end
    for i=1:N
        Z(1)=runge(Zold+eps);
        x(i+1)=x(i)+stepX;
```

```
        %Mencari k1,k2,k3,k4 untuk mencari rata2 slope
        k1h=frk(x(i)        ,Z(i)            ,T(i)            );
        k2h=frk(x(i)+stepX/2,Z(i)+stepX/2*k1h(1),T(i)+stepX/2*k1h(2));
        k3h=frk(x(i)+stepX/2,Z(i)+stepX/2*k2h(1),T(i)+stepX/2*k2h(2));
        k4h=frk(x(i)+stepX  ,Z(i)+stepX  *k3h(1),T(i)+stepX  *k3h(2));
        %Mencari nilai Z dan T step berikutnya
        Z(i+1)=Z(i)+1/6*(k1h(1)+2*k2h(1)+2*k3h(1)+k4h(1))*stepX;
        T(i+1)=T(i)+1/6*(k1h(2)+2*k2h(2)+2*k3h(2)+k4h(2))*stepX;
        bplus(i)=Z(i)-h/k*(T(i)-Tu);
    end
    c=bplus(N);
    a=b1(N);
    df=(bplus(N)-b1(N))/eps;
    Znew=Zold-b1(N)/df;
    er=abs((Zold-Znew)/Znew)*100;
    Zold=Znew;
end

fprintf('Distribusi Suhu terhadap Jarak(x) Sepanjang Rod\n')
fprintf('Jarak(cm) \t\t Suhu Rod (K)\n')
fprintf('%5.2f \t\t\t %5.4f\n',[xfinal(1:10:101); Tfinal(1:10:101)])
plot(xfinal,Tfinal)

%Mencari heat lost
for j=1:N
    ql(j)=Tfinal(j)-Tu;
end
for l=2:N-1
    if (-1)^l>0
        ql(l)=4*ql(l);
    else
        ql(l)=2*ql(l);
    end
end
dz=(L-0)/(N-1);
q=(pi*D*h*dz/3*sum(ql))+(pi/4*D^2*h*(Tfinal(N)-Tu));
qideal=((pi*D*L)+(pi/4*D^2))*h*(Ts-Tu);
%Efisiensi Fin
ef=q/qideal*100;

%menulis hasil kalor hilang dan efisiensi fin
fprintf('\n')
fprintf('Kalor hilang pada Fin %5.4f cal/det \n',[q])
fprintf('Kalor hilang pada Fin (kondisi ideal) %5.4f cal/det \n',
[qideal])
fprintf('Efisiensi Fin %4.2f persen \n',[ef])
fprintf('\n')

%daftar fungsi
    function y=frk(x,Z,T)
    dZdX=+4*h/(k*D) * ( T - Tu );
    dTdX=Z;
    y=[dZdX; dTdX];
    end
```

```
    function g=runge(A)
    g=A;
    end

end
```

```
Distribusi Suhu terhadap Jarak(x) Sepanjang Rod
Jarak(cm)    Suhu Rod (K)
 0.00     400.0000
 2.00     300.7736
 4.00     229.8970
 6.00     179.3576
 8.00     143.4420
10.00     118.0899
12.00     100.4353
14.00     88.4824
16.00     80.8799
18.00     76.7683
20.00     75.6829

Kalor hilang pada Fin 4.6156 cal/det
Kalor hilang pada Fin (kondisi ideal) 15.5862 cal/det
Efisiensi Fin 29.61 persen
```



Published with MATLAB® R2016a