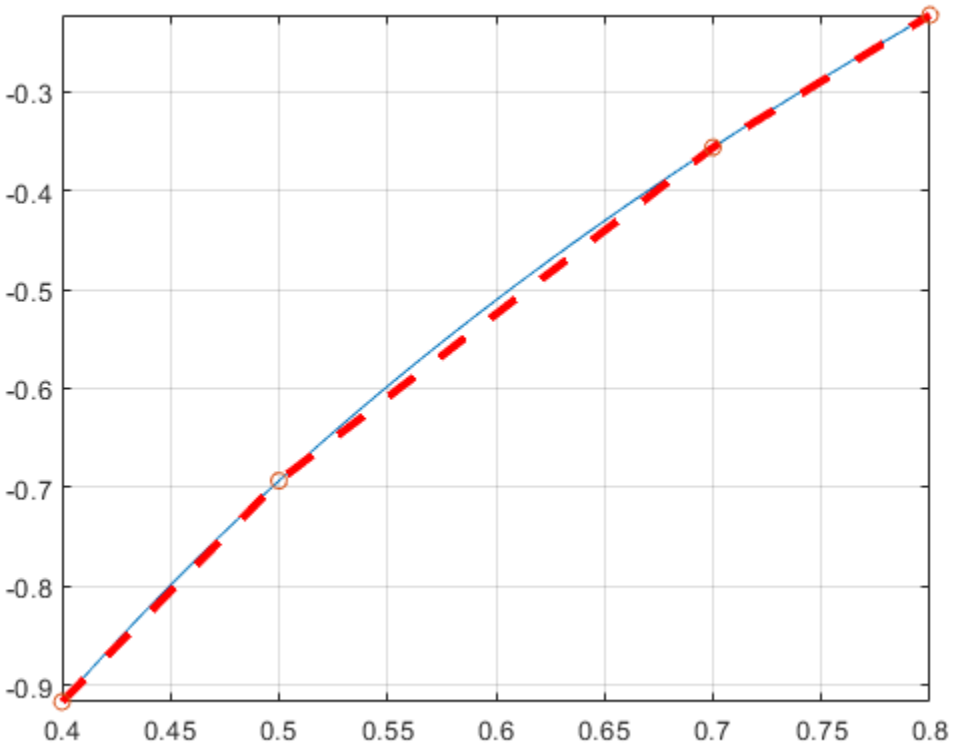
Contents

Ex1

```
X=[0.4 0.5 0.7 0.8];

f=@(x)log(x);

Y=f(X);

xgraf=linspace(0.4,0.8,200);

[ygraf]=SplineL(X,Y,xgraf);

figure(1);

fplot(f,[0.4 0.8]);

hold on;
grid on;
plot(xgraf,ygraf,"--r","LineWidth",3);
plot(X,Y,"o");
type('SplineL');
```

```
function [y] = SplineL(X,Y,x)

n=length(X)-1;

for j=1:n

    a(j)=Y(j);

    b(j)=(Y(j+1)-Y(j))/(X(j+1)-X(j));

end

nr=length(x);

for k=1:nr

for i=1:n



    if x(k)>=X(i) && x(k)<=X(i+1)

        indice=i;

        break;

    end

end

y(k)=a(indice)+b(indice)*(x(k)-X(indice));

end

end
```

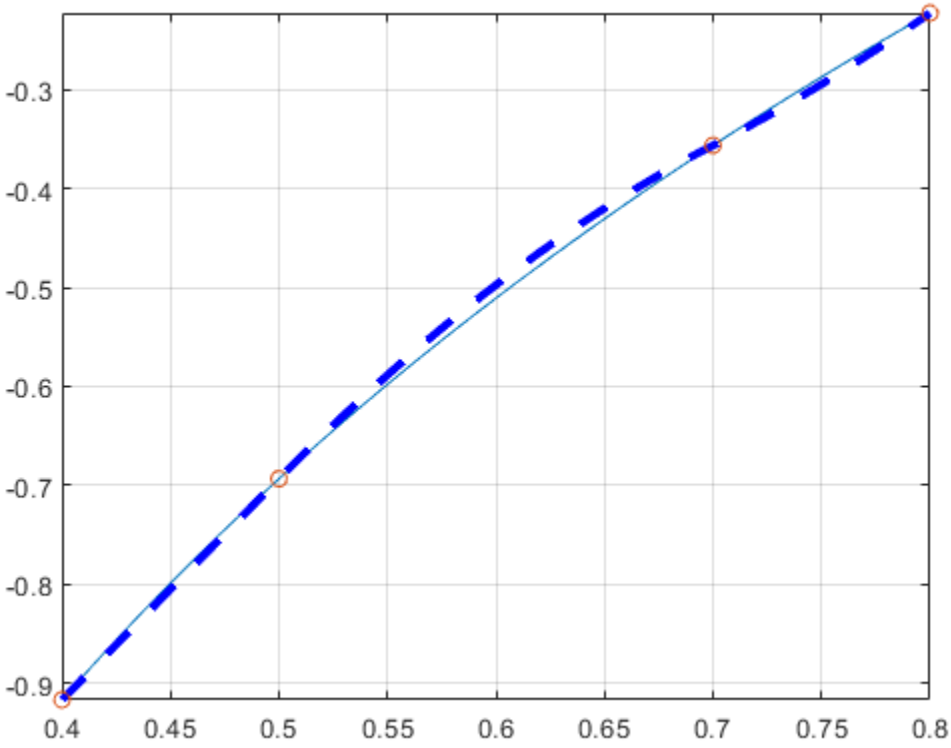


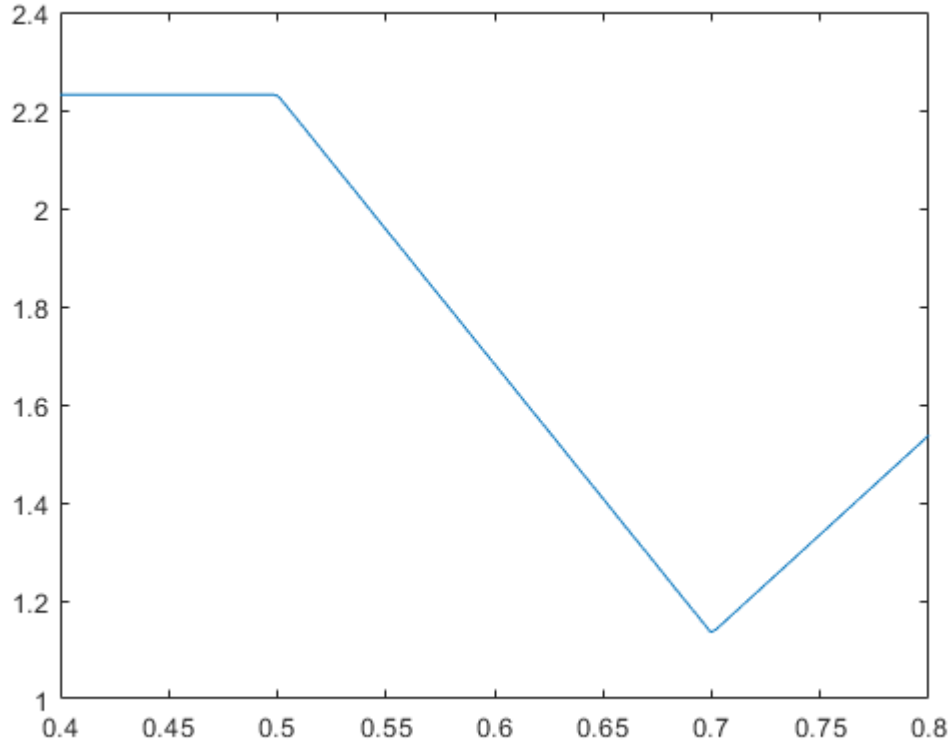
Ex2

```
X=[0.4 0.5 0.7 0.8];

f=@(x)log(x);

Y=f(X);

fpa=(Y(2)-Y(1))/(X(2)-X(1));

xgraf=linspace(0.4,0.8,200);

[ygraf zgraf]=SplineP(X,Y,xgraf,fpa);

figure(2);

fplot(f,[0.4,0.8]);

hold on;
grid on;
plot(xgraf,ygraf,"--b","LineWidth",3);
plot(X,Y,"o");
figure(3);
plot(xgraf,zgraf);
type('SplineP');
```

```
function [y z]=SplineP(X,Y,x,fpa)

n=length(X)-1;

for i=1:n

    h(i)=X(i+1)-X(i);

    a(i)=Y(i);
```

```
end
b(1)=fpa;
for i=1:n
    b(i+1)=2/h(i) * (Y(i+1)-Y(i))-b(i);
    c(i)=(1/(h(i)*h(i))) * (Y(i+1)-Y(i)-h(i)*b(i));
end
nr=length(x);
for k=1:nr
for i=1:n

    if x(k)>=X(i) && x(k)<=X(i+1)
        indice=i;
        break;
    end
end
y(k)=a(indice)+b(indice)*(x(k)-X(indice))+c(indice)*(x(k)-X(indice))^2;
z(k)=b(indice)+2*c(indice)*(x(k)-X(indice));
end
end
```


-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
0.4
0.45
0.5
0.55
0.6
0.65
0.7
0.75
0.8


2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.4
0.45
0.5
0.55
0.6
0.65
0.7
0.75
0.8

Ex3

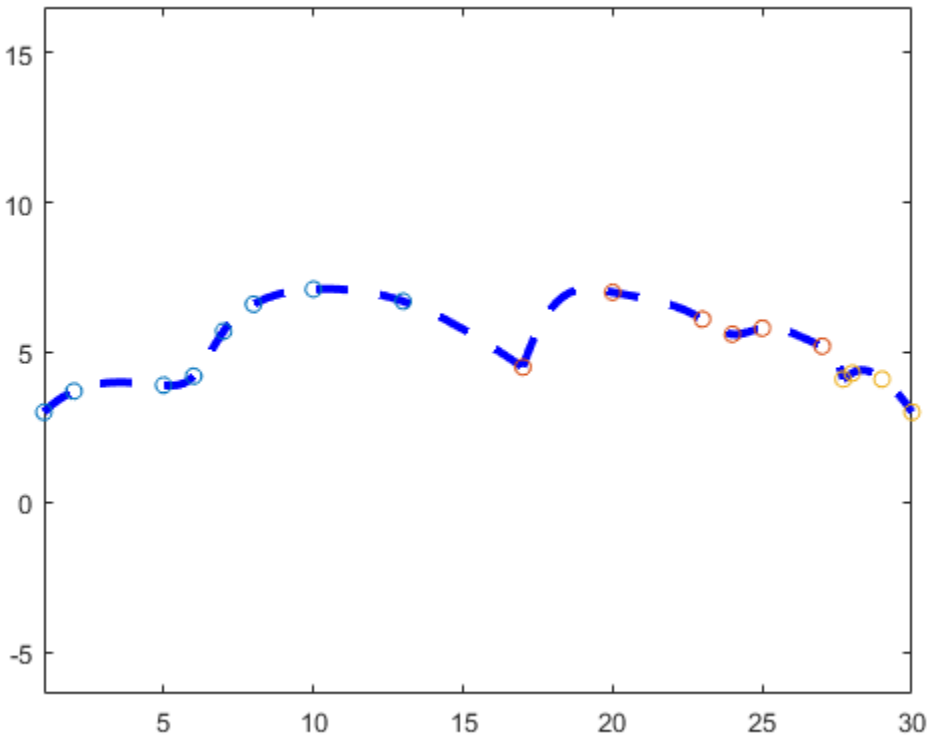
```
X1=[1 2 5 6 7 8 10 13 17];

Y1=[3.0 3.7 3.9 4.2 5.7 6.6 7.1 6.7 4.5];

fpa1=1.0;

fpb1=-0.67;

xgraf1=linspace(1,17,200);

[ygraf1 zgraf1 tgraf1]= splineC(X1,Y1,fpa1,fpb1,xgraf1);

X2=[17 20 23 24 25 27 27.7];

Y2=[4.5 7.0 6.1 5.6 5.8 5.2 4.1];

fpa2=3.0;

fpb2=-4.0;

xgraf2=linspace(17,27.7,200);

[ygraf2 zgraf2 tgraf2]= splineC(X2,Y2,fpa2,fpb2,xgraf2);

X3=[27.7 28 29 30];

Y3=[4.1 4.3 4.1 3.0]

fpa3=0.33;

fpb3=-1.5;

xgraf3=linspace(27.7,30,200);

[ygraf3 zgraf3 tgraf3]= splineC(X3,Y3,fpa3,fpb3,xgraf3);

figure(4);

plot(xgraf1,ygraf1,"--b","LineWidth",3);
hold on;
axis equal;
plot(X1,Y1,'o');
plot(xgraf2,ygraf2,"--b","LineWidth",3);
plot(X2,Y2,'o');
plot(xgraf3,ygraf3,"--b","LineWidth",3);
plot(X3,Y3,'o');
type('SplineC');
```

```
Y3 =


    4.1000    4.3000    4.1000    3.0000
```

```
function [y,z,t] = splineC(X,Y,fpa,fpb,x)

%SplineC Calculeaza functia spline cubica.


n=length(X)-1;
```

```
% Calculam coeficientii a(i) si h(i)
for i=1:n
    h(i)=X(i+1)-X(i);
    a(i)=Y(i);
end

% Calculam coeficientii b(i)

B(1,1)=1;
B(n+1,n+1)=1;
V(1)=fpa;
V(n+1)=fpb;
for j=2:n
B(j,j-1)=1/h(j-1);
B(j,j)=2/h(j) + 2/h(j-1);
B(j,j+1)=1/h(j);
V(j)=-3/h(j-1)^2 * Y(j-1) + (3/h(j-1)^2 - 3 /h(j)^2 ) * Y(j) + 3/h(j)^2 * Y(j+1);
end

b=gaussPivTot(B,V);

for j=1:n
    d(j)=-2/h(j)^3 * ( Y(j+1) - Y(j) ) + 1/h(j)^2 * ( b(j+1) + b(j));
    c(j)=3/h(j)^2 * ( Y(j+1) - Y(j) ) - ( b(j+1) + 2*b(j) ) / h(j) ;
end

nr=length(x);

for k=1:nr

for i=1:n

    if x(k)>=X(i) && x(k)<=X(i+1)
```

```
        indice=i;
        break;
    end
end

y(k)=a(indice)+b(indice)*(x(k)-X(indice))+c(indice)*(x(k)-X(indice))^2+d(indice)*(x(k)-X(indice))^3;
z(k)=b(indice)+2*c(indice)*(x(k)-X(indice))+3*d(indice)*(x(k)-X(indice))^2;
t(k)=2*c(indice)+6*d(indice)*(x(k)-X(indice));

end

end
```



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