

Cviceni 11

Orezavani oblasti

UKOL 1 - Cohen-Sutherland

Upravte funkci `cs_kod`, která pro zadanou orezovou oblast a bod, vrati kod tohoto bodu definovany v Cohen-Sutherlandove metode pro orezavani usecek.

Orezovy obdelnik je dan dvema body (levy horni roh a pravy dolni roh).

```
bod_oblasti1 = [0,0];  
bod_oblasti2 = [100,100];  
bod = [50,110];  
  
cs_kod(bod_oblasti1,bod_oblasti2, bod)
```



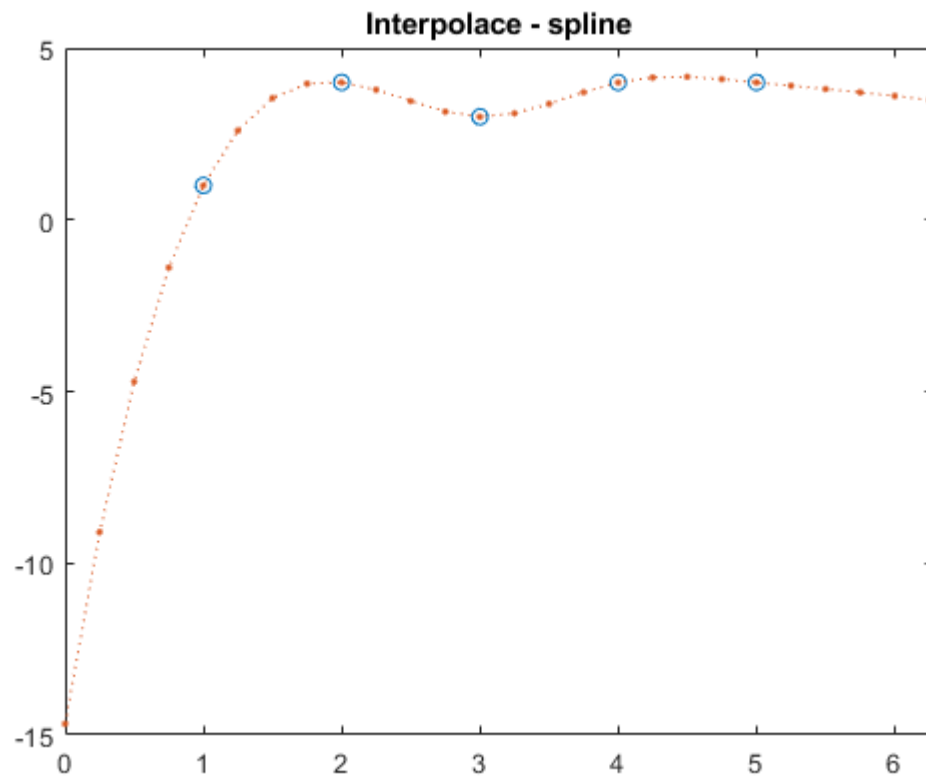
```
ans = 1x4  
     0     0     0     0
```

Interpolacni krivky

`vq = interp1(v,xq,method)`

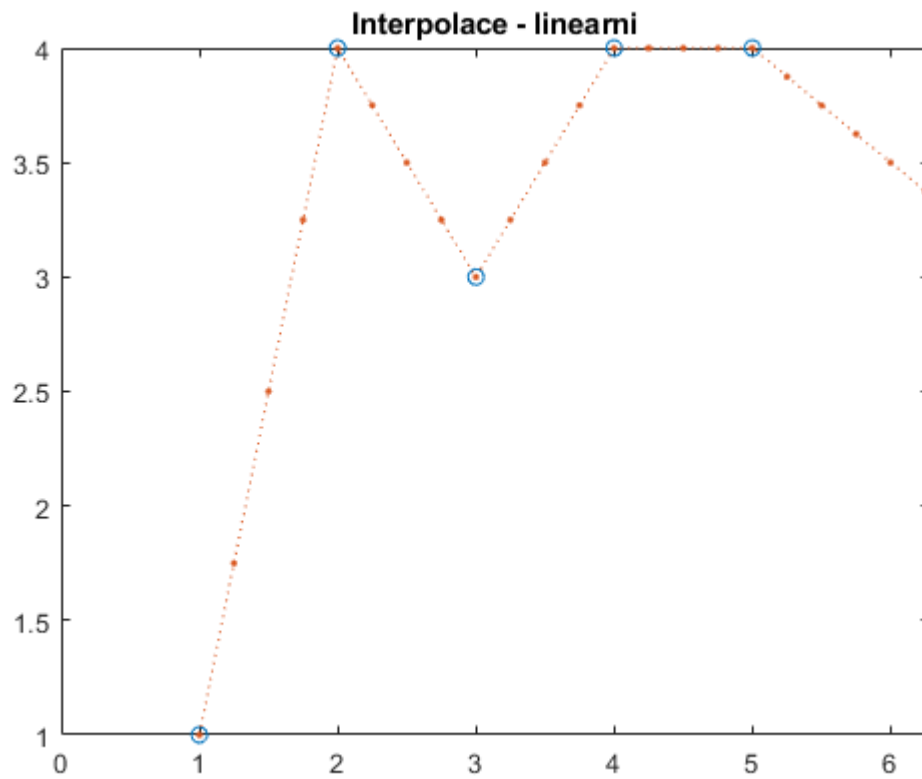
Spline

```
% kontrolni body  
x= [1 2 3 4 5 7 8 10];  
y = [1 4 3 4 4 3 2 1];  
  
xx = 0:.25:10;  
yy = interp1(x,y,xx,'spline');  
plot(x,y,'o',xx,yy,':');  
xlim([0 2*pi]);  
title('Interpolace - spline');
```



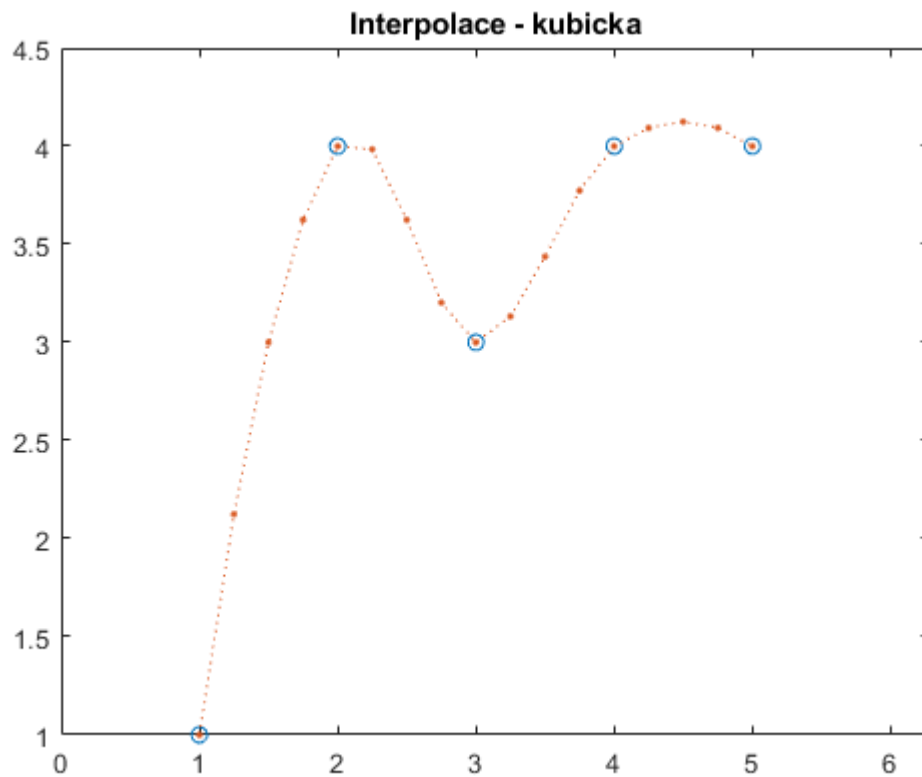
Linearni interpolace

```
yy = interp1(x,y,xx,'linear');  
plot(x,y,'o',xx,yy,':');  
xlim([0 2*pi]);  
title('Interpolace - linearni');
```



Kubická interpolace

```
% potrebuje kontrolni body ve stejne vzdalenosti, proto se berou jen prvni
yy = interp1(x(1:5),y(1:5),xx,'cubic');
plot(x,y,'o',xx,yy,':');
xlim([0 2*pi]);
title('Interpolace - kubicka');
```



Hermitovské kubiky

$$p(t) = (2t^3 - 3t^2 + 1)p_1 + (t^3 - 2t^2 + t)m_1 + (-2t^3 + 3t^2)p_2 + (t^3 - t^2)m_2$$

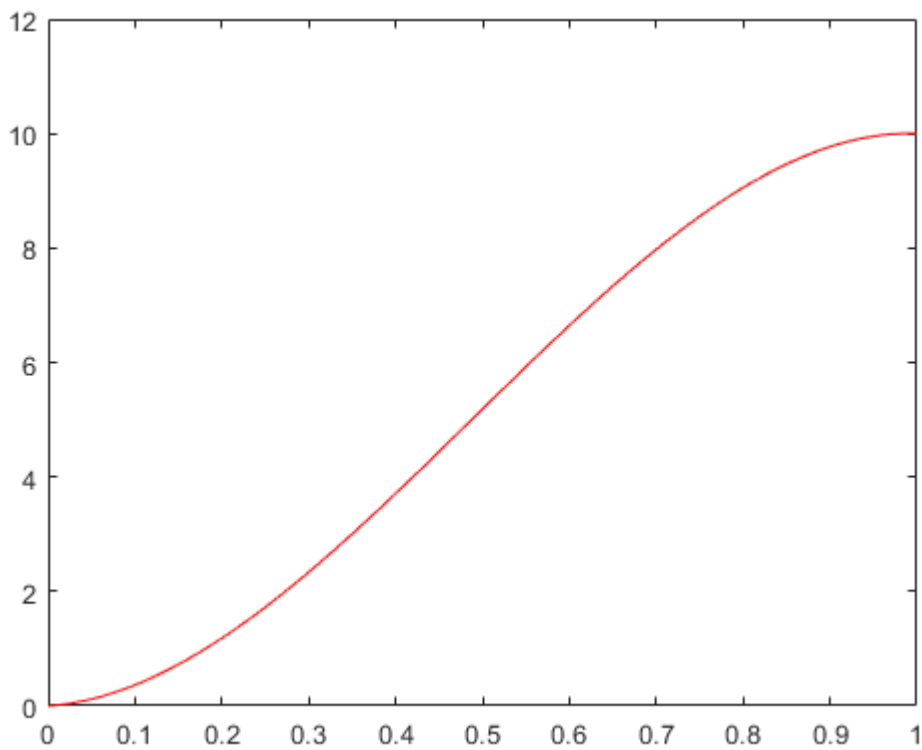
```
% body [x1,y1] a [x2,y2]
% tecny m1, m2
x1 = 0;
y1 = 0;
x2 = 1;
y2 = 10;

m1 = 1;
m2 = -0.5;

A = [x1^3,x2^3,3*x1^2,3*x2^2;x1^2,x2^2,2*x1,2*x2;x1,x2,1,1;1,1,0,0];
C = [y1,y2,m1,m2]/A;

n = 1000;
X = linspace(x1,x2,n);
Y = C*[X.^3;X.^2;X;ones(1,n)];

figure, plot(X,Y,'r-')
```



UKOL 2 - Aproximacni krivky

Naprogramujte naivni algoritmus na vypocet aproximacni Bezierovy kubiky.

$B = \text{bezier}(t, P)$

Funkce vrati bod pro zadane t a vektor $2 \times n$ kontrolnich bodu. (v případě kubik je $n = 4$)

Vzorecek je na slidu 10 z prednasky 12.

Pro vypocet kombinacniho cisla pouzijte funkci `nchoosek`.

```
b = [];  
  
P = [0 10 20 30;  
     0 10 15 0];  
for i = 0 : 0.01 : 1  
    b = [b, bezier( i, P )];  
end  
  
figure,  
plot(P(1,:), P(2,:));  
hold on;  
plot(b(1,:), b(2,:));
```

