

```

1  from numpy import zeros, array, linspace, dot, linalg
2  from matplotlib.pyplot import plot, axes, xlim, ylim
3
4  def Integration(x,u) :
5      N = len(x) - 1
6      int = 0.
7      for n in range(1,N+1) :
8          int = int + (u[n] + u[n-1])/2*(x[n] - x[n-1])
9      return int
10
11 def phi(x,k) :
12     return x**k
13
14 def Approximation(x,u,phi,K,a) :
15     N = len(x)-1; A = zeros((K+1,K+1)); B = zeros((K+1,1))
16     for m in range(K+1) :
17         for k in range(K+1) :
18             A[m,k] = Integration(x,phi(x,m)*phi(x,k))
19             B[m,0] = Integration(x,phi(x,m)*u)
20     C = linalg.solve(A,B)
21     sum = 0.
22     for k in range(K+1) :
23         sum = sum + C[k,0]*phi(a,k)
24     return(sum)
25
26 x = array([1, 2, 3, 5, 6, 7, 8, 9])
27 u = array([1, 4, 4, 2, 3, 3, 4, 2])
28
29 plot(x,u,'go',MarkerSize = 7)
30
31 a = min(x); b = max(x)
32 x_0 = (a + b)/2; x = (x - x_0)/((b - a)/2)
33
34 K = 7
35
36 x_approx = linspace(-1,1,100)
37 u_approx = Approximation(x,u,phi,K,x_approx)
38
39 x_approx = x_approx*((b - a)/2) + (a + b)/2
40 plot(x_approx,u_approx,'-r')
41 xlim([0,10]); ylim([0,6]); axes().set_aspect(1)
42
43 # Листинг программы, реализующей построение
44 # аппроксимирующей функции

```