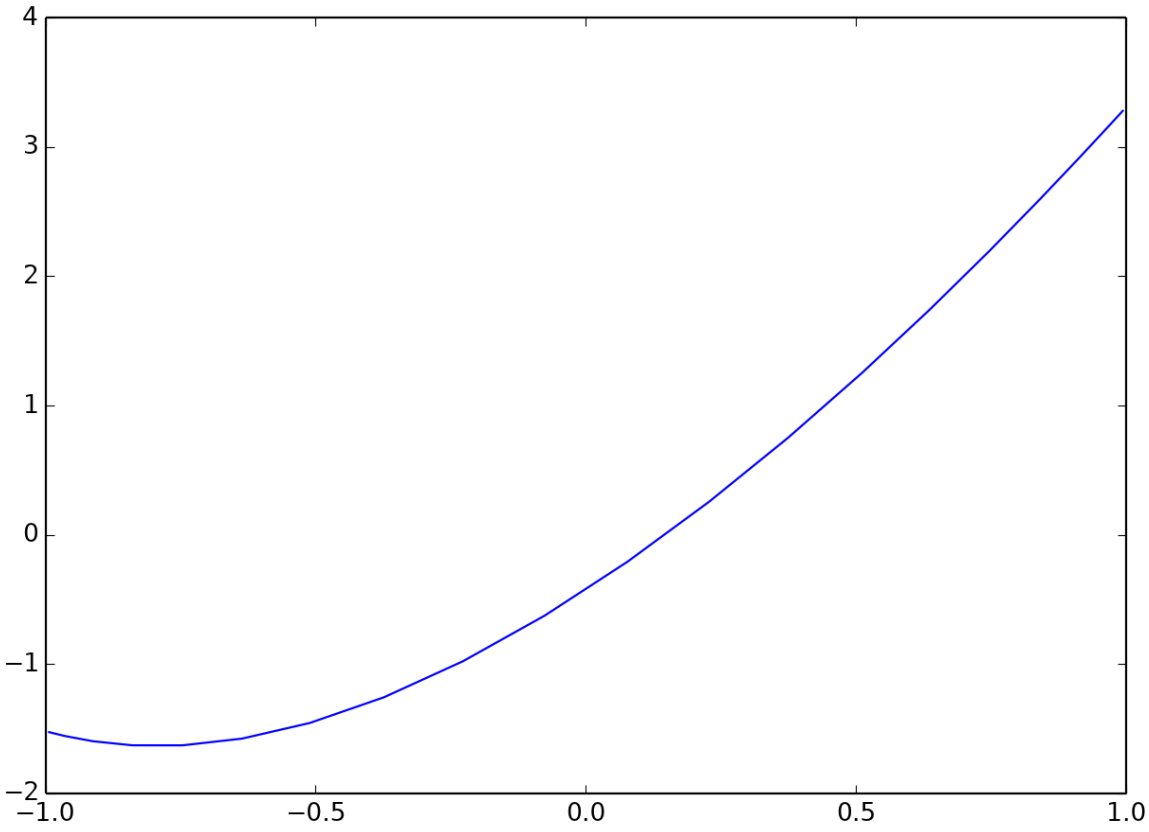
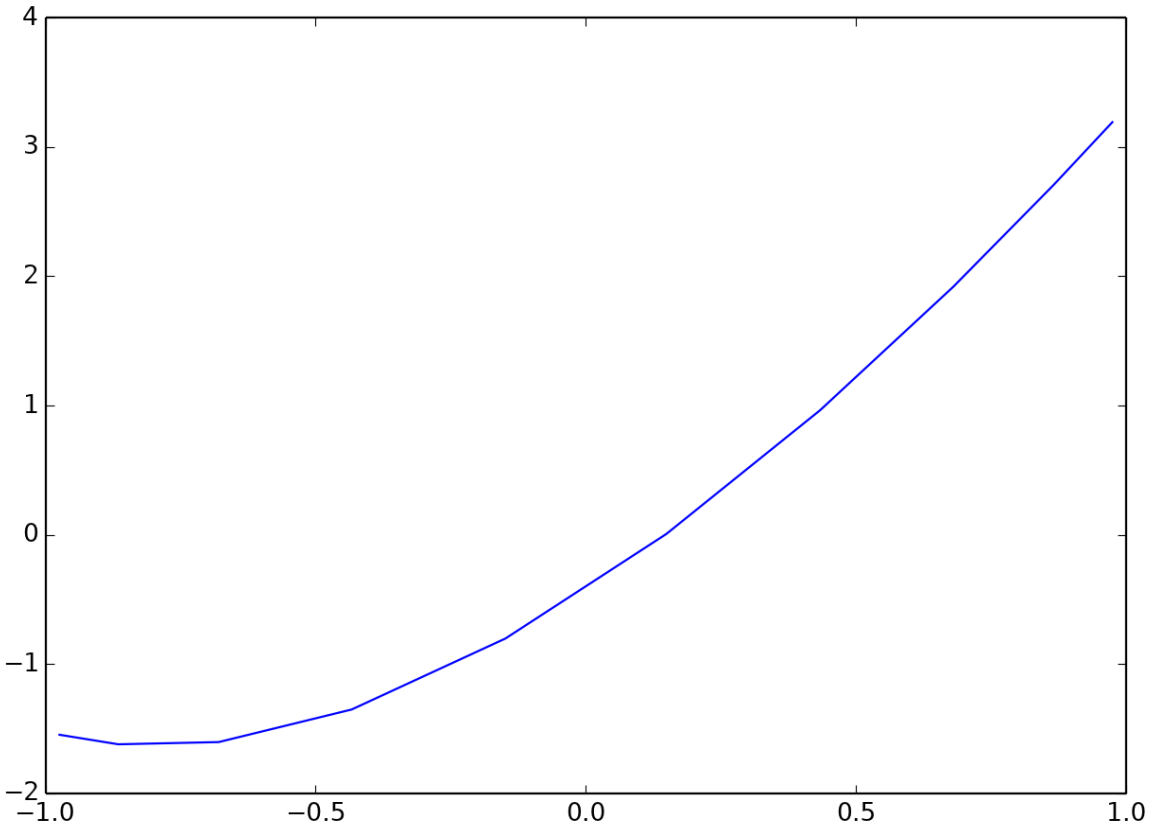
```python
# coding: utf-8
import math
import numpy as np
import Slozhna as sl
import matplotlib.pyplot as plt

alpha = 0.35
N = 8 # количество координатных функций
nodes = 10 # количество узлов в формуле Гаусса

def K(x,t):
    return math.log(1 + alpha*x*t)

def f(x):
    return math.log(2 + x)

leg_roots = sl.Leg_roots(nodes)
prav = []
for i in range(N):
    tmp = [f(root) * sl.Leg_pol(i,root) for root in leg_roots]
    prav.append(sl.Gauss_integr_ar(nodes, tmp))


A = np.empty([N,N])

for i in range(N):
    for k in range(i,N):
        ar = []
        for root1 in leg_roots:
            tmp = [K(root1, root) * sl.Leg_pol(k+1, root) for root in leg_roots]
            ar.append(-sl.Gauss_integr_ar(nodes, tmp) * sl.Leg_pol(i+1, root1))
        A[i][k] = sl.Gauss_integr_ar(nodes, ar)
    A[i][i] += 2 / float(2*i+3)
    for k in range(i):
        A[i][k] = A[k][i]

c = np.linalg.solve(A, prav)

u = []
for i in range(nodes):
    pols = sl.Leg_pol_list(N, leg_roots[i])
    u.append(sum([c[k]*pols[k+1] for k in range(N)]))

#u1 = [sum([c[k]*sl.Leg_pol(k+1, idx/100.0) for k in range(N)]) for idx in
range(-100,101)]

print 'Узлов:', nodes, '; Координатных функций:', N
print
print 'Решение:', u
print

plt.figure(1)
plt.plot(leg_roots, u)
#plt.plot([i/100.0 for i in range(-100, 101)], u1)
plt.show()
```

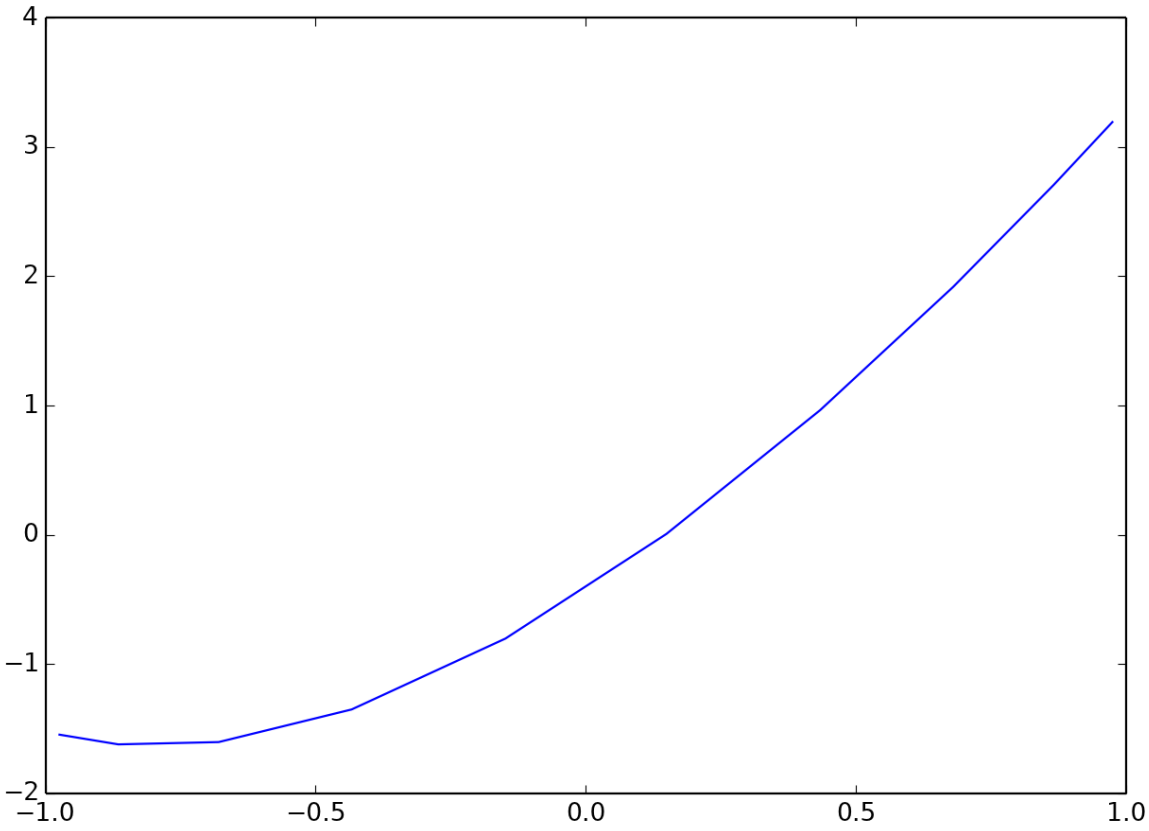
```
Узлов: 20 ; Координатных функций: 5

Решение: [3.2807547544852023, 3.1480451575048209, 2.9154212340671442, 2.5932297068316164,
2.1961164462696914, 1.7423381849600748, 1.2527510107126627, 0.74954787182081584,
0.25493402065359122, -0.21009529138030258, -0.62683615601324227, -0.97991705955701502,
-1.2584425903968512, -1.4572628567977732, -1.5781420791663578, -1.6303492771374413,
-1.6301075159509781, -1.5985265927787549, -1.5580908136986331, -1.5283161968044947]
```




```
Узлов: 10 ; Координатных функций: 5

Решение: [3.1931355807227506, 2.7066569569979464, 1.9183042062097817, 0.964121182475975,
0.0060275626185445907, -0.80340698346650274, -1.3529444135656477, -1.6050901818584986,
-1.622205579543659, -1.5485242506124011]
```




```
Узлов: 10 ; Координатных функций: 8

Решение: [3.1937044569967021, 2.7062729590125794, 1.9181893235689853, 0.96449628970609091,
0.0058868451709943549, -0.80370813713271205, -1.3525271322970454, -1.6050775573172382,
-1.6228386796367975, -1.5477187762876792]
```


4
3
2
1
0
−1
−2
−1.0
−0.5
0.0
0.5
1.0