Задача 9.2

In [1]:

```
import numpy as np
from scipy import optimize
from math import sqrt
from numpy.linalg import inv
import pandas as pd
import random
import matplotlib.pyplot as plt
```

In [2]:

```
input = open("496 Власова Анна.txt")
data = list(map(float, input.readlines()))
input.close()
```

По формуле $(Z * Z^T)^{-1} * Z^T * X$, получаем

In [3]:

```
z = list()
for i in np.arange(len(data)):
    z.append ([1, i])
z = np.matrix(z)
data = np.matrix(data).transpose()
res = inv(z.transpose() * z) * z.transpose() * data
print(res)
```

```
[[ 295.01526409]
 [   3.89565933]]
```

$\beta_1 = 295.01526409, \beta_2 = 3.89565933$

Для σ^2 :

$$\frac{1}{n-2}\|X - Z\theta_{MQ}\|^2$$

In [4]:

```
vec = data - z*res
sigma = (vec.transpose() * vec)/(len(data)-2)
print(sigma)
```

```
[[ 0.70393437]]
```

$\sigma^2 = 0.704$

In [5]:

```
sigma_t = sigma/(res[1]**2)
print (sigma_t)
```

```
[[ 0.04638422]]
```

$\sigma_t^2 = 0.046$

In [10]:

```
output = open("496 Власова Анна.txt", 'w')
output.write(str(res[0])+" "+str(res[1])+" "+str(sigma)+" "+str(sigma_t))
output.close()
```