

```
In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import scipy.stats as sts
%matplotlib inline
```

```
In [3]: file_obj = open('Weibull.csv', 'r')
date = np.array([])
for line in file_obj:
    date = np.append(date, float(line))
file_obj.close()
print date.size
```

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$$p(x) = 1 - \exp^{-x^\gamma} I(x \geq 0) \Big|, \text{ где } \gamma > 0$$

Функция правдоподобия  $f(x) = \prod (1 - \exp^{-(X_i)^\gamma})$  достигает своего максимума на тех же значениях, на которых функция  $g(x) = \sum \ln(1 - \exp^{-(X_i)^\gamma})$  достигает максимума

```
In [4]: def g(X, t):
        result = 1
        for i in X:
            result += np.log(1 - np.exp(-(i)**t))

        return result
```

## Для первых 4 лет

```
In [5]: t = np.arange(-2, 2, 0.001)
t = 10**t
N = 4*365+1
min_id = 0
min_value = g(date[:N], t[min_id])

for i in xrange(0, t.size):
    value = g(date[:N], t[i])
    if(value < min_value):
        min_value = value
        min_id = i

print t[min_id]
```

0.01

**Ответ: 0.01**

## Для 10 лет

```
In [6]: t = np.arange(-2, 2, 0.001)
t = 10**t
N = 3652
min_id = 0
min_value = g(date[:N], t[min_id])

for i in xrange(0, t.size):
    value = g(date[:N], t[i])
    if(value < min_value):
        min_value = value
        min_id = i

print t[min_id]

0.01
```

**Ответ: 0.01**