Инсталирани на необходимите библиотеки

```
!pip install numpy
!pip install matplotlib
!pip install seaborn
!pip install scipy
!pip install pandas
!pip install numpy-financial
!pip install sympy
!pip install statsmodels
!pip install pyxlsb
```

Зареждане на необходимите библиотеки

```
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import *
import pandas as pd
import numpy_financial as npf
import sympy as sp
import statsmodels as sm
```

Данни за дял хронични разпределения и техната интерпретация с методи на статистическия анализ

Разглеждаме данни за дял хронични разпределения на Лапласовото разстояние върху 4 случая, които се генерират по различен начин на шумен сигнал. Генерирането целяло и сравнило по 5000, по стар начин(всичко от 1 до 4) и по нов начин(всичко от 5 до 8) случайни величини с Mu=0.0000 и Sigma=0.1000, и с Mu=0.0000 и Sigma=0.0500.

```
df = pandas.read_excel('Kurtosis_distribution_and_Laplace_distribution.xlsb', sheet='Sheet1')
df.head()
```

	Unnamed	Value
0	0.000000	0.001-0.0010
1	0.000000	0.001-0.0010
2	0.000000	0.001-0.0010
3	0.000000	0.001-0.0010
4	0.000000	0.001-0.0010

```
df.drop(columns=['Unnamed'], inplace=True)
df.head()
```

	Value
0	0.001-0.0010
1	0.001-0.0010
2	0.001-0.0010
3	0.001-0.0010
4	0.001-0.0010

```
df.shape
```

```
(5000, 1)
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5000 entries, 0 to 4999
Data columns (total 1 columns):
 #   Value  5000 non-null   object
dtypes: object(1)
memory usage: 39.1+ KB
```

```
df.describe()
```

	Value
count	5000
unique	2
top	0.001-0.0010
freq	2500

```
df['Value'].unique()
```

```
array(['0.001-0.0010', '0.0001-0.0010'], dtype=object)
```

```
df['Value'].value_counts()
```

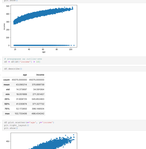
```
Value
0.001-0.0010    2500
0.0001-0.0010   2500
Name: count, dtype: int64
```

```
df['Value'].value_counts(normalize=True)
```

```
Value
0.001-0.0010    0.5
0.0001-0.0010   0.5
Name: proportion, dtype: float64
```

5000 care 1 стойност

```
df.plot.hist(bins=2, alpha=0.7)
plt.title('Value')
plt.show()
```




```
df['Value'].value_counts(normalize=True).plot.pie(autopct='%1.1f%%')
plt.title('Value')
plt.show()
```

```
df['Value'].sample(5)
```

```
3    0.001-0.0010
1    0.001-0.0010
4    0.001-0.0010
2    0.001-0.0010
0    0.001-0.0010
Name: Value, dtype: object
```

```
df['Value'].sample(5).plot.hist(bins=2, alpha=0.7)
plt.title('Value')
plt.show()
```

```
df['Value'].sample(5).value_counts(normalize=True).plot.pie(autopct='%1.1f%%')
plt.title('Value')
plt.show()
```

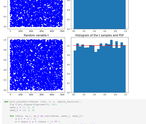
```
df['Value'].sample(5).value_counts(normalize=True)
```

```
Value
0.001-0.0010    0.6
0.0001-0.0010   0.4
Name: proportion, dtype: float64
```

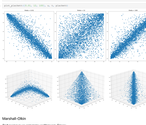
```
df['Value'].sample(5).value_counts(normalize=True).plot.bar(alpha=0.7)
plt.title('Value')
plt.show()
```

```
df['Value'].sample(5).value_counts(normalize=True).plot.barh(alpha=0.7)
plt.title('Value')
plt.show()
```

```
df['Value'].sample(5).value_counts(normalize=True).plot.area(alpha=0.7)
plt.title('Value')
plt.show()
```




```
df['Value'].sample(5).value_counts(normalize=True).plot.barh(alpha=0.7)
plt.title('Value')
plt.show()
```



За дял копули да се начертают графиките, графиките на линиите на ниво и да се генерират случайни извадки с 5000 points и да се представят визуущия

Plackett

Дефиниция на копулата на Плакет

```
!pip install copulas
```

```
Collecting copulas
  Downloading copulas-0.12.1-py3-none-any.whl (54 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 54.1/54.1 kB 1.4 MB/s eta 0:00:00
Requirement already satisfied: numpy<2.0.0,>=1.20.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: pandas>=1.1.3 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: scipy<1.14.0,>=1.7.3 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: numpydoc<1.7.0,>=1.2.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: tqdm<4.67.0,>=4.29.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: pyyaml<6.0.2,>=6.0.1 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: boto3<1.35.0,>=1.28 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: python-dateutil<2.9.0,>=2.7.3 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: botocore<1.35.0,>=1.31 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: s3transfer<0.10.0,>=0.9.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: pytz<2025.2>=2022.7 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: tzdata<2025.2>=2022.7 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: sphinx<7.0.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: tomli<2.0.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: tomlkit<0.13.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: typing-extensions<4.12.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: sphinx-rtd-theme<1.3.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: sphinx-gallery<0.15.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: matplotlib<3.9.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: numpy-financial<1.0.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: plotly<5.19.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: rdt<1.12.0,>=1.12.1 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: sdv<1.13.0,>=1.13.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: sdmetrics<0.14.0,>=0.14.1 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: copyfiles<2.4,>=2.3.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: jinja2<3.1.0,>=3.0.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: graphviz<0.20.1,>=0.18.1 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: ipywidgets<8.0.0,>=7.0.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: nbformat<5.10.0,>=5.5.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: rich<13.7.0,>=12.5.1 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: scikit-learn<1.5.0,>=1.3.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: tabulate<0.9.0,>=0.8.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: ctgan<0.10.0,>=0.9.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: deepecho<0.6.0,>=0.5.0 in /usr/local/lib/python3.10/dist-packages (copulas)
Requirement already satisfied: boto3<1.35.0,>=1.28
```

```
+ + + ( gamma_inf(s), mf_2, mapsto(0.1) + zeta_inf(s), zeta(1), zeta_mapsto(1) * p_planck(1), 0)
```

```
+ + + 0.0000000000000000
```

```
+ + + ( gamma_inf(s), mf_2, mapsto(0.1) + zeta_inf(s), zeta(1), zeta_mapsto(1) * p_planck(1_plus(0), 0)
```

```
+ + + 0.0000000000000000
```

```
+ + + ( Operator(document) ==> INFLATOR( inflation_product_lqcd)
  Operator(document) ==> INFLATOR( inflation_product_lqcd) ==> Operator(
  Operator(document) ==> Error: Failed type 'Operator' in inflation_product_lqcd
  Operator(document) ==> Error: Failed type 'Operator' in inflation_product_lqcd
```