```
In [1]:    1  pip install numpy
           2
```

Requirement already satisfied: numpy in c:\users\teppa\appdata\local\programs
\python\python310\lib\site-packages (1.24.3)
Note: you may need to restart the kernel to use updated packages.

```
In [2]:    1  pip install pip --upgrade
```

Requirement already satisfied: pip in c:\users\teppa\appdata\local\programs\p
ython\python310\lib\site-packages (23.1.2)Note: you may need to restart the k
ernel to use updated packages.

```
In [3]:    1  pip install numpy
           2
```

Requirement already satisfied: numpy in c:\users\teppa\appdata\local\programs
\python\python310\lib\site-packages (1.24.3)
Note: you may need to restart the kernel to use updated packages.

```
In [4]:    1  pip install pandas
           2
```

Requirement already satisfied: pandas in c:\users\teppa\appdata\local\program
s\python\python310\lib\site-packages (2.0.1)Note: you may need to restart the
kernel to use updated packages.

Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\teppa\appda
ta\local\programs\python\python310\lib\site-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\users\teppa\appdata\local\p
rograms\python\python310\lib\site-packages (from pandas) (2023.3)
Requirement already satisfied: tzdata>=2022.1 in c:\users\teppa\appdata\local
\programs\python\python310\lib\site-packages (from pandas) (2023.3)
Requirement already satisfied: numpy>=1.21.0 in c:\users\teppa\appdata\local
\programs\python\python310\lib\site-packages (from pandas) (1.24.3)
Requirement already satisfied: six>=1.5 in c:\users\teppa\appdata\local\progr
ams\python\python310\lib\site-packages (from python-dateutil>=2.8.2->pandas)
(1.16.0)

```
In [5]:    1  import numpy as np
           2  import pandas as pd
```

```
In [6]:  1  df=pd.read_csv(r"C:\Users\teppa\Downloads\fiat500_VehicleSelection_Dataset
         2  df
```

Out[6]:

	Unnamed: 0	Unnamed: 1	Unnamed: 2	Unnamed: 3	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7
0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
...	...	...	...	...	...	...	...	...
342	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
343	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
344	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
345	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
346	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

347 rows × 112 columns

```
In [7]:  1  df.head(10)
```

Out[7]:

	Unnamed: 0	Unnamed: 1	Unnamed: 2	Unnamed: 3	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7	U
0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	

10 rows × 112 columns

```
In [8]:    1  df.shape
```

Out[8]: (347, 112)

```
In [9]:    1  df.describe()
```

Out[9]:

	Unnamed: 0	Unnamed: 1	Unnamed: 2	Unnamed: 3	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7
count	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mean	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
std	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
min	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
25%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
50%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
75%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
max	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

8 rows × 112 columns

```
In [10]:    1  df.tail()
```

Out[10]:

	Unnamed: 0	Unnamed: 1	Unnamed: 2	Unnamed: 3	Unnamed: 4	Unnamed: 5	Unnamed: 6	Unnamed: 7
342	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
343	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
344	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
345	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
346	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

5 rows × 112 columns

```
In [11]:    1  df.isna
```

```
Out[11]:  <bound method DataFrame.isna of      Unnamed: 0  Unnamed: 1  Unnamed: 2  Unna
          med: 3  Unnamed: 4  Unnamed: 5
          0          NaN         NaN         NaN         NaN         NaN         NaN
          \
          1          NaN         NaN         NaN         NaN         NaN         NaN
          2          NaN         NaN         NaN         NaN         NaN         NaN
          3          NaN         NaN         NaN         NaN         NaN         NaN
          4          NaN         NaN         NaN         NaN         NaN         NaN
          ..         ...         ...         ...         ...         ...         ...
          342        NaN         NaN         NaN         NaN         NaN         NaN
          343        NaN         NaN         NaN         NaN         NaN         NaN
          344        NaN         NaN         NaN         NaN         NaN         NaN
          345        NaN         NaN         NaN         NaN         NaN         NaN
          346        NaN         NaN         NaN         NaN         NaN         NaN

                 Unnamed: 6  Unnamed: 7  Unnamed: 8  Unnamed: 9  ...  Unnamed: 102
          0          NaN         NaN         NaN         NaN  ...           NaN  \
          1          NaN         NaN         NaN         NaN  ...           NaN
          2          NaN         NaN         NaN         NaN  ...           NaN
          3          NaN         NaN         NaN         NaN  ...           NaN
          4          NaN         NaN         NaN         NaN  ...           NaN
          ..         ...         ...         ...         ...  ...           ...
          342        NaN         NaN         NaN         NaN  ...           NaN
          343        NaN         NaN         NaN         NaN  ...           NaN
          344        NaN         NaN         NaN         NaN  ...           NaN
          345        NaN         NaN         NaN         NaN  ...           NaN
          346        NaN         NaN         NaN         NaN  ...           NaN

                 Unnamed: 103  Unnamed: 104  Unnamed: 105  Unnamed: 106  Unnamed: 107
          0          NaN          NaN          NaN          NaN          NaN  \
          1          NaN          NaN          NaN          NaN          NaN
          2          NaN          NaN          NaN          NaN          NaN
          3          NaN          NaN          NaN          NaN          NaN
          4          NaN          NaN          NaN          NaN          NaN
          ..         ...          ...          ...          ...          ...
          342        NaN          NaN          NaN          NaN          NaN
          343        NaN          NaN          NaN          NaN          NaN
          344        NaN          NaN          NaN          NaN          NaN
          345        NaN          NaN          NaN          NaN          NaN
          346        NaN          NaN          NaN          NaN          NaN

                 Unnamed: 108  Unnamed: 109  Unnamed: 110  Unnamed: 111
          0          NaN          NaN          NaN          NaN
          1          NaN          NaN          NaN          NaN
          2          NaN          NaN          NaN          NaN
          3          NaN          NaN          NaN          NaN
          4          NaN          NaN          NaN          NaN
          ..         ...          ...          ...          ...
          342        NaN          NaN          NaN          NaN
          343        NaN          NaN          NaN          NaN
          344        NaN          NaN          NaN          NaN
          345        NaN          NaN          NaN          NaN
          346        NaN          NaN          NaN          NaN

          [347 rows x 112 columns]>
```

```
df.isna().any()
```

```
Unnamed: 0        True
Unnamed: 1        True
Unnamed: 2        True
Unnamed: 3        True
Unnamed: 4        True
                  ...
Unnamed: 107      True
Unnamed: 108      True
Unnamed: 109      True
Unnamed: 110      True
Unnamed: 111      True
Length: 112, dtype: bool
```

```
In [13]:    1  df.info
```

```
Out[13]: <bound method DataFrame.info of        Unnamed: 0  Unnamed: 1  Unnamed: 2  Unna
         med: 3  Unnamed: 4  Unnamed: 5
         0          NaN         NaN         NaN         NaN         NaN         NaN
         \
         1          NaN         NaN         NaN         NaN         NaN         NaN
         2          NaN         NaN         NaN         NaN         NaN         NaN
         3          NaN         NaN         NaN         NaN         NaN         NaN
         4          NaN         NaN         NaN         NaN         NaN         NaN
         ..         ...         ...         ...         ...         ...         ...
         342        NaN         NaN         NaN         NaN         NaN         NaN
         343        NaN         NaN         NaN         NaN         NaN         NaN
         344        NaN         NaN         NaN         NaN         NaN         NaN
         345        NaN         NaN         NaN         NaN         NaN         NaN
         346        NaN         NaN         NaN         NaN         NaN         NaN

              Unnamed: 6  Unnamed: 7  Unnamed: 8  Unnamed: 9  ...  Unnamed: 102
         0          NaN         NaN         NaN         NaN  ...           NaN  \
         1          NaN         NaN         NaN         NaN  ...           NaN
         2          NaN         NaN         NaN         NaN  ...           NaN
         3          NaN         NaN         NaN         NaN  ...           NaN
         4          NaN         NaN         NaN         NaN  ...           NaN
         ..         ...         ...         ...         ...  ...           ...
         342        NaN         NaN         NaN         NaN  ...           NaN
         343        NaN         NaN         NaN         NaN  ...           NaN
         344        NaN         NaN         NaN         NaN  ...           NaN
         345        NaN         NaN         NaN         NaN  ...           NaN
         346        NaN         NaN         NaN         NaN  ...           NaN

              Unnamed: 103  Unnamed: 104  Unnamed: 105  Unnamed: 106  Unnamed: 107
         0            NaN           NaN           NaN           NaN           NaN  \
         1            NaN           NaN           NaN           NaN           NaN
         2            NaN           NaN           NaN           NaN           NaN
         3            NaN           NaN           NaN           NaN           NaN
         4            NaN           NaN           NaN           NaN           NaN
         ..           ...           ...           ...           ...           ...
         342          NaN           NaN           NaN           NaN           NaN
         343          NaN           NaN           NaN           NaN           NaN
         344          NaN           NaN           NaN           NaN           NaN
         345          NaN           NaN           NaN           NaN           NaN
         346          NaN           NaN           NaN           NaN           NaN

              Unnamed: 108  Unnamed: 109  Unnamed: 110  Unnamed: 111
         0            NaN           NaN           NaN           NaN
         1            NaN           NaN           NaN           NaN
         2            NaN           NaN           NaN           NaN
         3            NaN           NaN           NaN           NaN
         4            NaN           NaN           NaN           NaN
         ..           ...           ...           ...           ...
         342          NaN           NaN           NaN           NaN
         343          NaN           NaN           NaN           NaN
         344          NaN           NaN           NaN           NaN
         345          NaN           NaN           NaN           NaN
         346          NaN           NaN           NaN           NaN

         [347 rows x 112 columns]>
```

```
In [14]:    1  pip install scipy
```

Requirement already satisfied: scipy in c:\users\teppa\appdata\local\programs
\python\python310\lib\site-packages (1.10.1)
Requirement already satisfied: numpy<1.27.0,>=1.19.5 in c:\users\teppa\appdat
a\local\programs\python\python310\lib\site-packages (from scipy) (1.24.3)
Note: you may need to restart the kernel to use updated packages.

```
In [15]:    1  import numpy as np
            2  import pandas as pd
            3  from numpy.random import randn
            4  from numpy.random import seed
            5  from scipy.stats import spearmanr
            6  seed(1)
            7  data1=20*randn(1000)+100
            8  data2=data1+(0*randn(1000)+50)
            9  corr,_=spearmanr(data1,data2)
           10  print('spearmans correlation%.3f' %corr)
```

spearmans correlation1.000

```
In [16]:    1  import numpy as np
            2  import pandas as pd
            3  from numpy.random import randn
            4  from numpy.random import seed
            5  from numpy import cov
            6  seed(1)
            7  data1=20*randn(1000)+100
            8  data2=data1+(10*randn(1000)+50)
            9  covariance=cov(data1,data2)
           10  print(covariance)
```

[[385.33297729 389.7545618]
 [389.7545618 500.38006058]]

```
In [17]:    1  import numpy as np
            2  import pandas as pd
            3  from numpy.random import randn
            4  from numpy.random import seed
            5  from scipy.stats import pearsonr
            6  data1=20*randn(1000)+100
            7  data2=data1+(10*randn(1000)+50)
            8  corr,_=pearsonr(data1,data2)
            9  print("pearsons correlation:%.3f" %corr)
```

pearsons correlation:0.891

```
In [18]:    1  pip install statsmodels
```

Requirement already satisfied: statsmodels in c:\users\teppa\appdata\local\pr
ograms\python\python310\lib\site-packages (0.14.0)
Requirement already satisfied: numpy>=1.18 in c:\users\teppa\appdata\local\pr
ograms\python\python310\lib\site-packages (from statsmodels) (1.24.3)
Requirement already satisfied: scipy!=1.9.2,>=1.4 in c:\users\teppa\appdata\l
ocal\programs\python\python310\lib\site-packages (from statsmodels) (1.10.1)
Requirement already satisfied: pandas>=1.0 in c:\users\teppa\appdata\local\pr
ograms\python\python310\lib\site-packages (from statsmodels) (2.0.1)
Requirement already satisfied: patsy>=0.5.2 in c:\users\teppa\appdata\local\p
rograms\python\python310\lib\site-packages (from statsmodels) (0.5.3)
Requirement already satisfied: packaging>=21.3 in c:\users\teppa\appdata\loca
l\programs\python\python310\lib\site-packages (from statsmodels) (23.1)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\teppa\appda
ta\local\programs\python\python310\lib\site-packages (from pandas>=1.0->stats
models) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\users\teppa\appdata\local\p
rograms\python\python310\lib\site-packages (from pandas>=1.0->statsmodels) (2
023.3)
Requirement already satisfied: tzdata>=2022.1 in c:\users\teppa\appdata\local
\programs\python\python310\lib\site-packages (from pandas>=1.0->statsmodels)
(2023.3)
Requirement already satisfied: six in c:\users\teppa\appdata\local\programs\p
ython\python310\lib\site-packages (from patsy>=0.5.2->statsmodels) (1.16.0)
Note: you may need to restart the kernel to use updated packages.

```
In [19]:    1  import pandas as pd
            2  import statsmodels as sm
            3  from scipy import stats
            4  from statsmodels.stats import weightstats as stests
            5  data=[89,93,97,98,96,99,97,110,104,119,105,104,110,110,112,115,114]
            6  z_test,p_val=stests.ztest(data,x2=None,value=160)
            7  print(p_val)
            8  if p_val<0.05:
            9      print("We can reject the null hypothesis")
           10  else:
           11      print("we can accet the null hypothesis")
           12
           13
```

5.5796197354978736e-157
We can reject the null hypothesis

```
1  from scipy.stats import ttest_1samp
2  import numpy as np
3  ages=[45,89,23,46,12,69,45,24,34,67]
4  print(ages)
5  mean=np.mean(ages)
6  print(mean)
7  t_test,p_val=ttest_1samp(ages,30)
8  print("_value is :",p_val)
9  if p_val<0.5:
10     print("we can reject the null hypothesis")
11 else:
12     print("We can accept the null hyothesis")
13
```

```
[45, 89, 23, 46, 12, 69, 45, 24, 34, 67]
45.4
_value is : 0.07179988272763561
we can reject the null hypothesis
```

```
1  from scipy.stats import ttest_ind
2  import numpy as np
3  data_group1=np.array([12,18,12,13,15,1,7,20,21,25,19,31,21,17,15,19,5,12,
4  data_group2=np.array([23,22,24,25,21,26,21,21,25,30,24,21,23,19,14,18,14,
5  mean1=np.mean(data_group1)
6  mean2=np.mean(data_group2)
7  print("Data group1.mean value:",mean1)
8  print("Data group2.mean value:",mean2)
9  std1=np.std(data_group1)
10 std2=np.std(data_group2)
11 print("Data group1 std value:",std1)
12 print("Data group2 std value :",std2)
13 t_test,p_val=ttest_ind(data_group1,data_group2)
14 print("The p_value is :",p_val)
15 if p_val<0.5:
16     print("we can reject the null hypothesis")
17 else:
18     print("We can accept the null hyothesis")
```

```
Data group1.mean value: 15.68421052631579
Data group2.mean value: 21.35
Data group1 std value: 6.805977493342834
Data group2 std value : 4.327528162819972
The p_value is : 0.00436107719276935
we can reject the null hypothesis
```

```
In [22]: 1  import scipy.stats
         2  data1=[0.0842,0.0368,0.0847,0.0935,0.0376,0.0963,0.0684,0.0758,0.0854,0.08
         3  data2=[0.0785,0.0845,0.0758,0.0853,0.0946,0.0785,0.0853,0.0685]
         4  data3=[0.0864,0.2522,0.0894,0.2724,0.0853,0.1367,0.853]
         5  F_test,p_val=scipy.stats.f_oneway(data1,data2,data3)
         6  print("p_value is:",p_val)
         7  if p_val<0.5:
         8      print("we can reject the null hypothesis")
         9  else:
        10      print("We can accept the null hyothesis")
```

```
p_value is: 0.04043792126789142
we can reject the null hypothesis
```

```
In [23]: 1  from scipy.stats import chi2_contingency
         2  data=[[231,256,321],[245,312,213]]
         3  test,p_val,dof,expected_val=chi2_contingency(data)
         4  alpha=0.05
         5  print("The p_value of our test is",((p_val)))
         6  if p_val<=alpha:
         7      print("we can reject")
         8  else:
         9      print("we can accept the null hypothesis")
```

```
The p_value of our test is 1.4585823594475804e-06
we can reject
```

```
In [24]: 1  pip install scikit-learn
```

```
Requirement already satisfied: scikit-learn in c:\users\teppa\appdata\local\p
rograms\python\python310\lib\site-packages (1.2.2)
Requirement already satisfied: numpy>=1.17.3 in c:\users\teppa\appdata\local
\programs\python\python310\lib\site-packages (from scikit-learn) (1.24.3)
Requirement already satisfied: scipy>=1.3.2 in c:\users\teppa\appdata\local\p
rograms\python\python310\lib\site-packages (from scikit-learn) (1.10.1)
Requirement already satisfied: joblib>=1.1.1 in c:\users\teppa\appdata\local
\programs\python\python310\lib\site-packages (from scikit-learn) (1.2.0)
Requirement already satisfied: threadpoolctl>=2.0.0 in c:\users\teppa\appdata
\local\programs\python\python310\lib\site-packages (from scikit-learn) (3.1.
0)
Note: you may need to restart the kernel to use updated packages.
```

```
In [25]: 1  from sklearn.metrics import mean_squared_error
         2  Y_act=[1,4,3,2,6]
         3  Y_pred=[0.6,1.29,2.69,3.4,5.2]
         4  mean_squared_error(Y_act,Y_pred)
```

```
Out[25]: 2.04004
```

```
In [26]: 1  from scipy.stats import binom
```

```
In [27]:    1  pip install matplotlib
```

Requirement already satisfied: matplotlib in c:\users\teppa\appdata\local\pro
grams\python\python310\lib\site-packages (3.7.1)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\teppa\appdata\loc
al\programs\python\python310\lib\site-packages (from matplotlib) (1.0.7)
Requirement already satisfied: cycler>=0.10 in c:\users\teppa\appdata\local\p
rograms\python\python310\lib\site-packages (from matplotlib) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in c:\users\teppa\appdata\lo
cal\programs\python\python310\lib\site-packages (from matplotlib) (4.39.4)
Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\teppa\appdata\lo
cal\programs\python\python310\lib\site-packages (from matplotlib) (1.4.4)
Requirement already satisfied: numpy>=1.20 in c:\users\teppa\appdata\local\pr
ograms\python\python310\lib\site-packages (from matplotlib) (1.24.3)
Requirement already satisfied: packaging>=20.0 in c:\users\teppa\appdata\loca
l\programs\python\python310\lib\site-packages (from matplotlib) (23.1)
Requirement already satisfied: pillow>=6.2.0 in c:\users\teppa\appdata\local
\programs\python\python310\lib\site-packages (from matplotlib) (9.5.0)
Requirement already satisfied: pyparsing>=2.3.1 in c:\users\teppa\appdata\loc
al\programs\python\python310\lib\site-packages (from matplotlib) (3.0.9)
Requirement already satisfied: python-dateutil>=2.7 in c:\users\teppa\appdata
\local\programs\python\python310\lib\site-packages (from matplotlib) (2.8.2)
Requirement already satisfied: six>=1.5 in c:\users\teppa\appdata\local\progr
ams\python\python310\lib\site-packages (from python-dateutil>=2.7->matplotli
b) (1.16.0)
Note: you may need to restart the kernel to use updated packages.
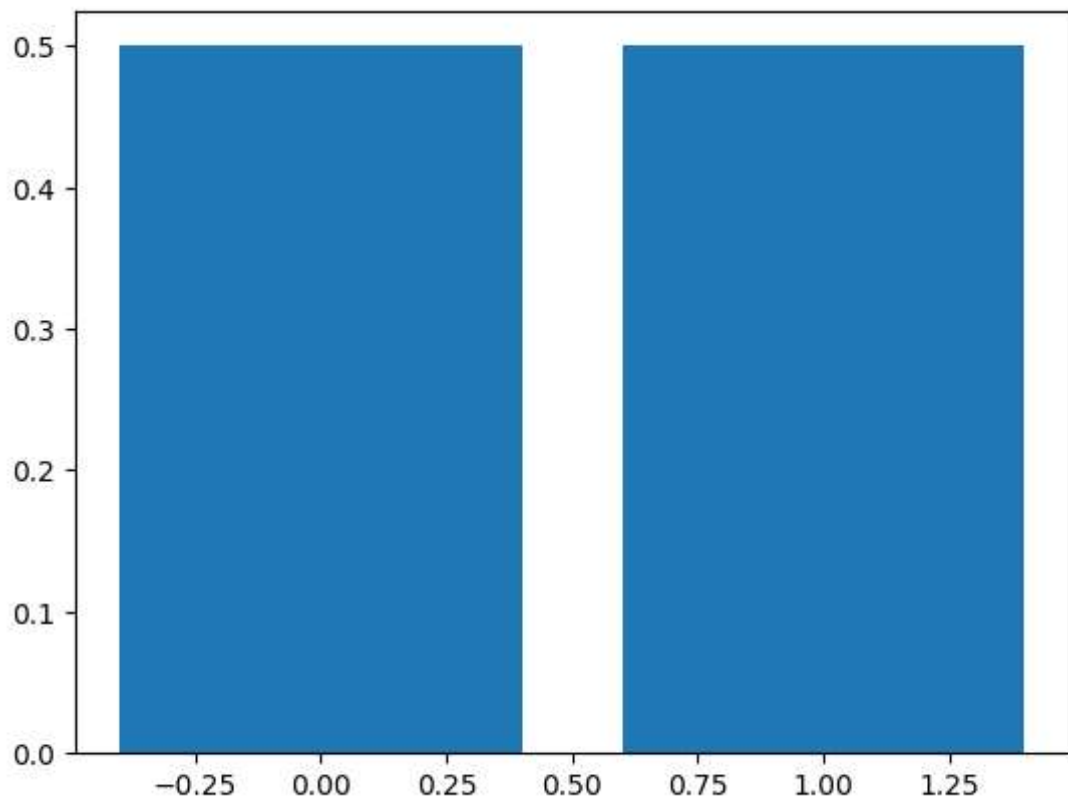
```
In [28]:    1  import matplotlib.pyplot as plt
```

```
1  n=5
2  p=0.4
3  r_values=list(range(n+1))
4  dist=[binom.pmf(r,n,p) for r in r_values]
5  plt.bar(r_values,dist)
6  plt.show()
```
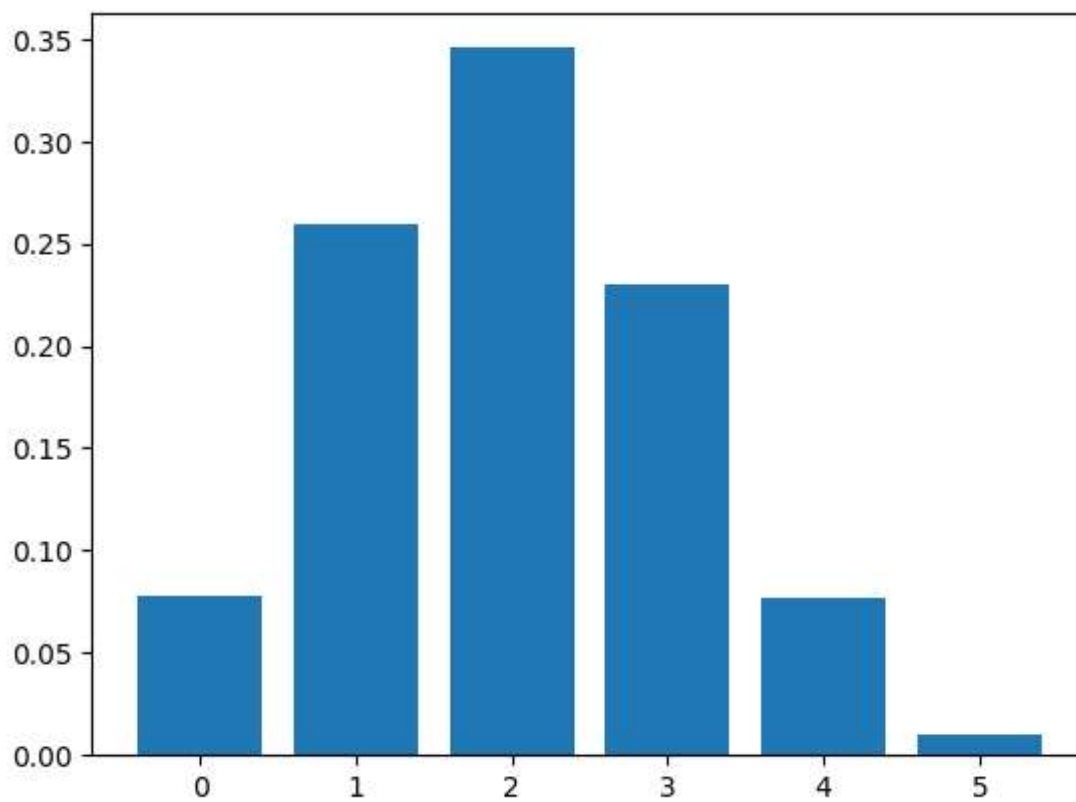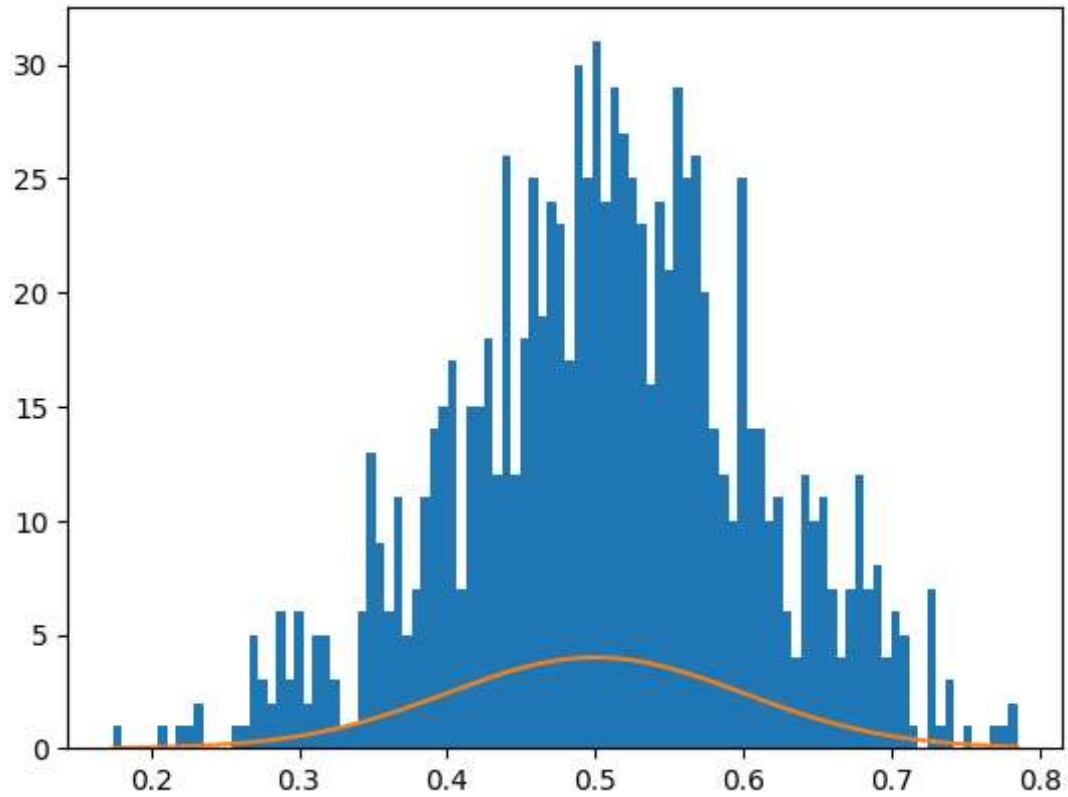
In [30]:
```python
import matplotlib.pyplot as plt
from scipy.stats import bernoulli
bd=bernoulli(0.5)
X=[0,1]
plt.bar(X,bd.pmf(X))
plt.show()
```
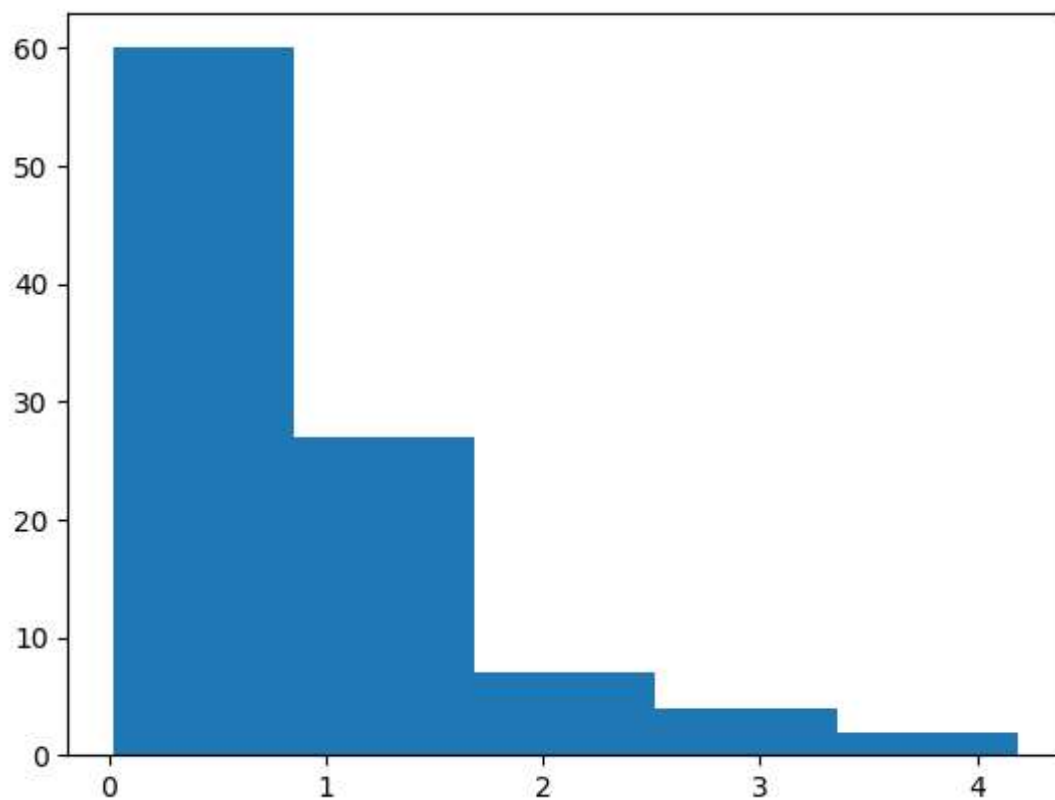

In [ ]:

```
In [31]:  1  import matplotlib.pyplot as lt
          2  import numpy as np
          3  mu,sigma=0.5,0.1
          4  s=np.random.normal(mu,sigma,1000)
          5  count,bins,ignored=plt.hist(s,100)
          6  plt.plot(bins,1/(sigma*np.sqrt(2*np.pi))*np.exp(-(bins-mu)**2/(2*sigma**2
          7  plt.show()
```

```
1  import numpy as np
2  import matplotlib.pyplot as plt
3  exp=np.random.exponential(1,100)
4  count,bins,ignored=plt.hist(exp,5)
5  plt.show()
```

In [33]:

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[33], line 5
      3 bd=bernoulli(0.2)
      4 x=[0,1]
----> 5 plt.bar(x,bd)

File ~\AppData\Local\Programs\Python\Python310\lib\site-packages\matplotlib\p
yplot.py:2439, in bar(x, height, width, bottom, align, data, **kwargs)
   2435 @_copy_docstring_and_deprecators(Axes.bar)
   2436 def bar(
   2437         x, height, width=0.8, bottom=None, *, align='center',
   2438         data=None, **kwargs):
-> 2439     return gca().bar(
   2440         x, height, width=width, bottom=bottom, align=align,
   2441         **({"data": data} if data is not None else {}), **kwargs)

File ~\AppData\Local\Programs\Python\Python310\lib\site-packages\matplotlib\_
_init__.py:1459, in _preprocess_data.<locals>.inner(ax, data, *args, **kwarg
s)
   1456 @functools.wraps(func)
   1457 def inner(ax, *args, data=None, **kwargs):
   1458     if data is None:
-> 1459         return func(ax, *map(sanitize_sequence, args), **kwargs)
   1461     bound = new_sig.bind(ax, *args, **kwargs)
   1462     auto_label = (bound.arguments.get(label_namer)
   1463                     or bound.kwargs.get(label_namer))

File ~\AppData\Local\Programs\Python\Python310\lib\site-packages\matplotlib\a
xes\_axes.py:2480, in Axes.bar(self, x, height, width, bottom, align, **kwarg
s)
   2477 args = zip(left, bottom, width, height, color, edgecolor, linewidth,
   2478           hatch, patch_labels)
   2479 for l, b, w, h, c, e, lw, htch, lbl in args:
-> 2480     r = mpatches.Rectangle(
   2481         xy=(l, b), width=w, height=h,
   2482         facecolor=c,
   2483         edgecolor=e,
   2484         linewidth=lw,
   2485         label=lbl,
   2486         hatch=htch,
   2487         )
   2488     r._internal_update(kwargs)
   2489     r.get_path()._interpolation_steps = 100

File ~\AppData\Local\Programs\Python\Python310\lib\site-packages\matplotlib\_
api\deprecation.py:454, in make_keyword_only.<locals>.wrapper(*args, **kwarg
s)
    448 if len(args) > name_idx:
    449     warn_deprecated(
    450         since, message="Passing the %(name)s %(obj_type)s "
    451         "positionally is deprecated since Matplotlib %(since)s; the "
    452         "parameter will become keyword-only %(removal)s.",
    453         name=name, obj_type=f"parameter of {func.__name__}()")
--> 454 return func(*args, **kwargs)

File ~\AppData\Local\Programs\Python\Python310\lib\site-packages\matplotlib\p
```

```
atches.py:728, in Rectangle.__init__(self, xy, width, height, angle, rotation
_point, **kwargs)
    721 # Required for RectangleSelector with axes aspect ratio != 1
    722 # The patch is defined in data coordinates and when changing the
    723 # selector with square modifier and not in data coordinates, we need
    724 # to correct for the aspect ratio difference between the data and
    725 # display coordinate systems. Its value is typically provide by
    726 # Axes._get_aspect_ratio()
    727 self._aspect_ratio_correction = 1.0
--> 728 self._convert_units()

File ~\AppData\Local\Programs\Python\Python310\lib\site-packages\matplotlib\p
atches.py:739, in Rectangle._convert_units(self)
    737 y0 = self.convert_yunits(self._y0)
    738 x1 = self.convert_xunits(self._x0 + self._width)
--> 739 y1 = self.convert_yunits(self._y0 + self._height)
    740 return x0, y0, x1, y1

TypeError: unsupported operand type(s) for +: 'int' and 'rv_discrete_frozen'
```
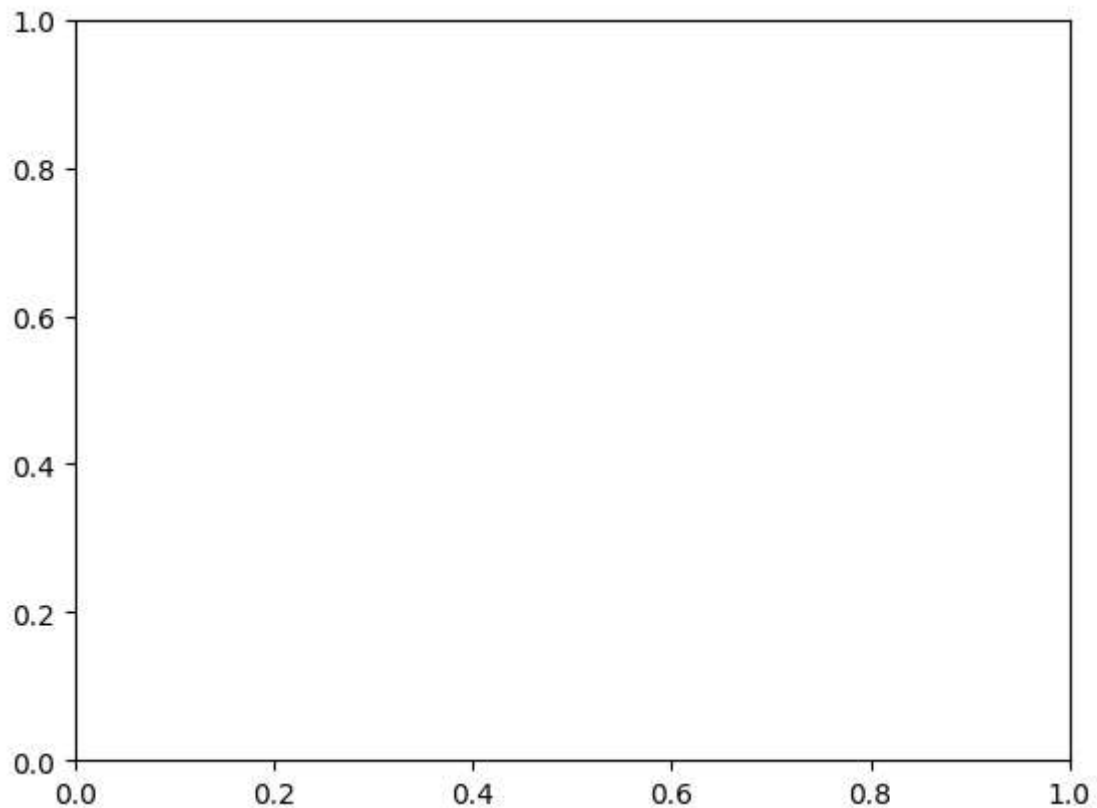


```
In [ ]:   1
```