Statistic Practical Implement

Measure of central Tendency

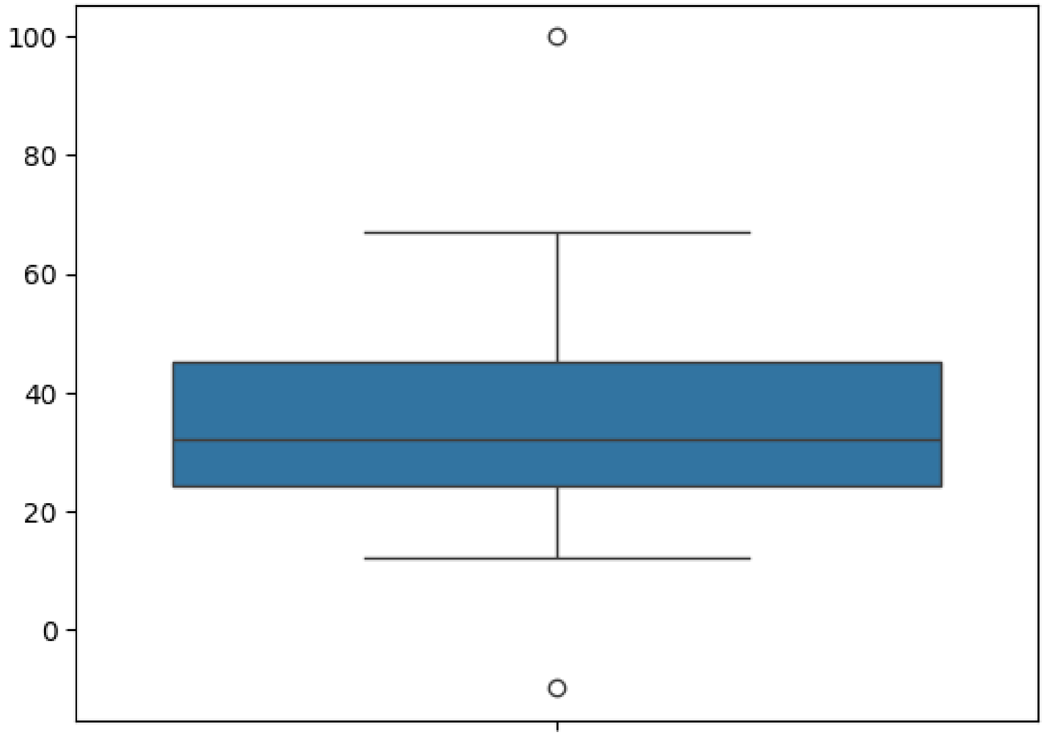
1. Mean
2. Median
3. Mode

```
# Find out mean
ages = [ 23,24,32,45,12,43,67,45,32,56,32,420]

import numpy as np

np.mean(ages)

np.float64(69.25)

#Median
np.median(ages)

np.float64(37.5)

ages = [ 23,24,32,45,12,43,67,45,32,56,32]

#Median
np.median(ages)

np.float64(32.0)

# mode
# np.mode(ages) numpy dost have mode function you have to use
statistics lib

import statistics as st

# your can calcualte mean , median, mode
print(st.mean(ages))
print(st.median(ages))
print(st.mode(ages))

69.25
37.5
32
```

want to see outlair to use by seabor | metlop

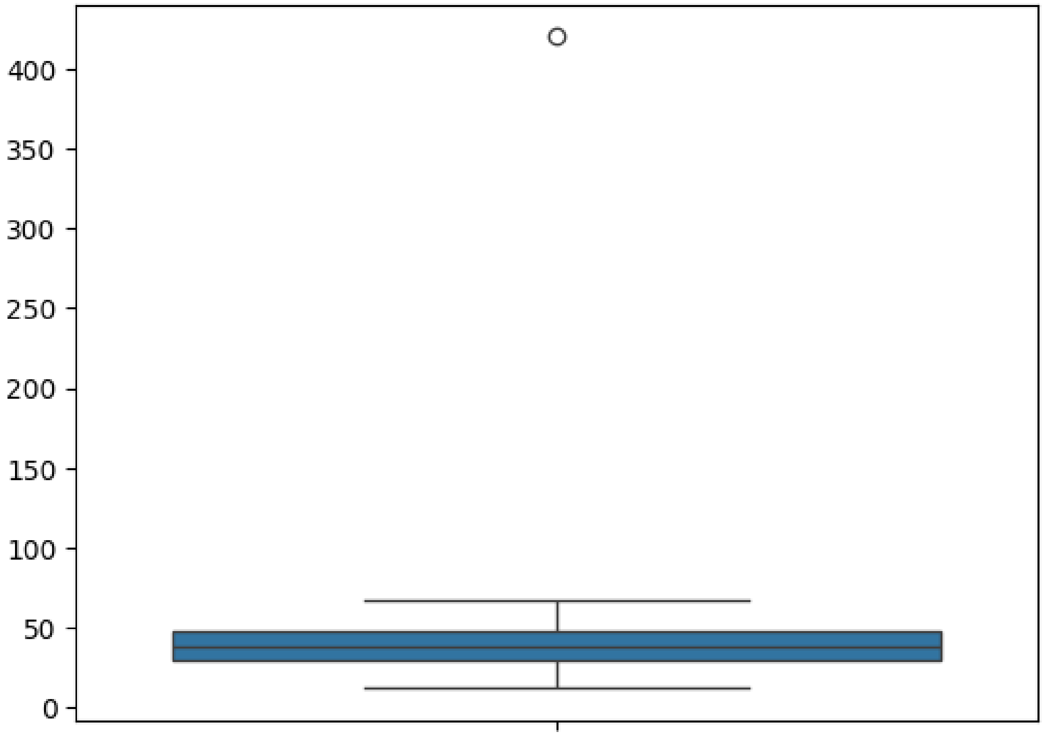
```
ages = [ -10,23,24,32,45,12,43,67,45,32,56,32,100]

import seaborn as sns
sns.boxplot(ages)
```

```
<Axes: >
```




```
ages = [ 23,24,32,45,12,43,67,45,32,56,32,420]

import seaborn as sns
sns.boxplot(ages)
```

```
<Axes: >
```



5 Number Summary :

1. Minimum
2. First quantile (25%) Q1
3. Median Quantile (50%)Q2
4. Third Quantile (75%)Q3
5. Mazxmum

Boxplot

ages = [23,24,32,45,12,43,67,45,32,56,32,420]

```
### 5 Number
q1,q3 = np.percentile(ages,[25,75])
print(q1, q3)
```

```
30.0 47.75
```

```
q1
```

```
np.float64(30.0)
```

```
q3
```

```
np.float64(47.75)
```

IQR = q1 -q3 Lower_fence = q1 - 15.*(IQR) higer_fence = q3+1.5(IQR)

```
IQR = q3 - q1
Lower_fence = q1 - 1.5*(IQR)
higer_fence = q3 + 1.5*(IQR)

print ("-----")

print( Lower_fence, higer_fence)
```

```
-----
3.375 74.375
```

Measur eof Dispersion

1. Variance
2. Standard Deviation

data ages = [23,24,32,45,12,43,67,45,32,56,32,420]

```
ages = [ 23,24,32,45,12,43,67,45,32,56,32]

# Variance  for sample data
st.variance(ages)
```

```
248.85454545454544
```

```
# standar deviation  google _ std in statistics  for sample data
st.stdev(ages)
```

```
15.775124261144361
```

For population data

```
st.pvariance(ages) # for populatio on data
```

```
226.23140495867767
```

```
# standar devation to make square

import math
math.sqrt(st.pvariance(ages))
```

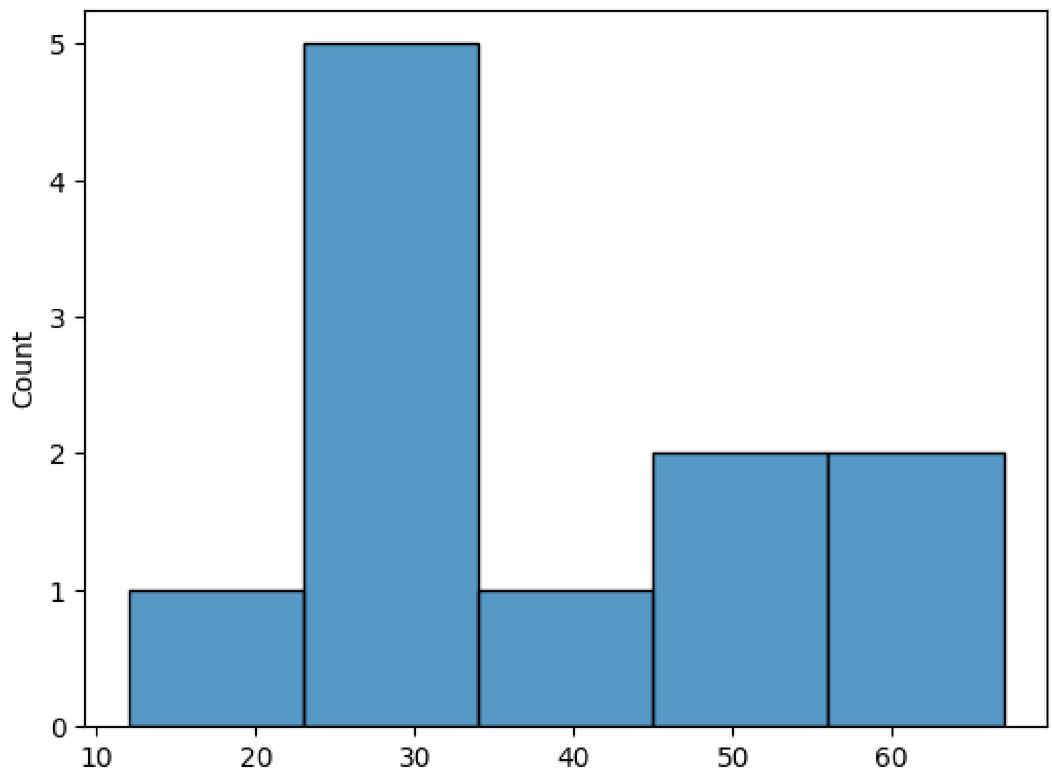
```
15.040990823701664
```

Histograms and PDF

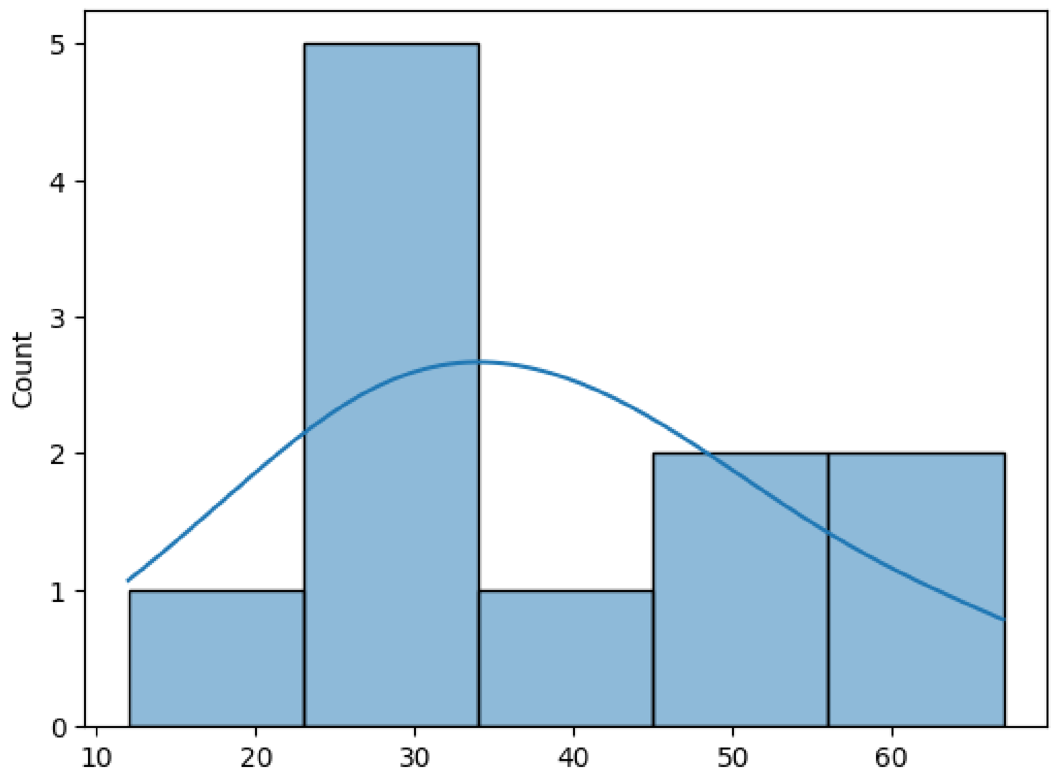
seaborn

```
ages = [ 23,24,32,45,12,43,67,45,32,56,32]
sns.histplot(ages)
```

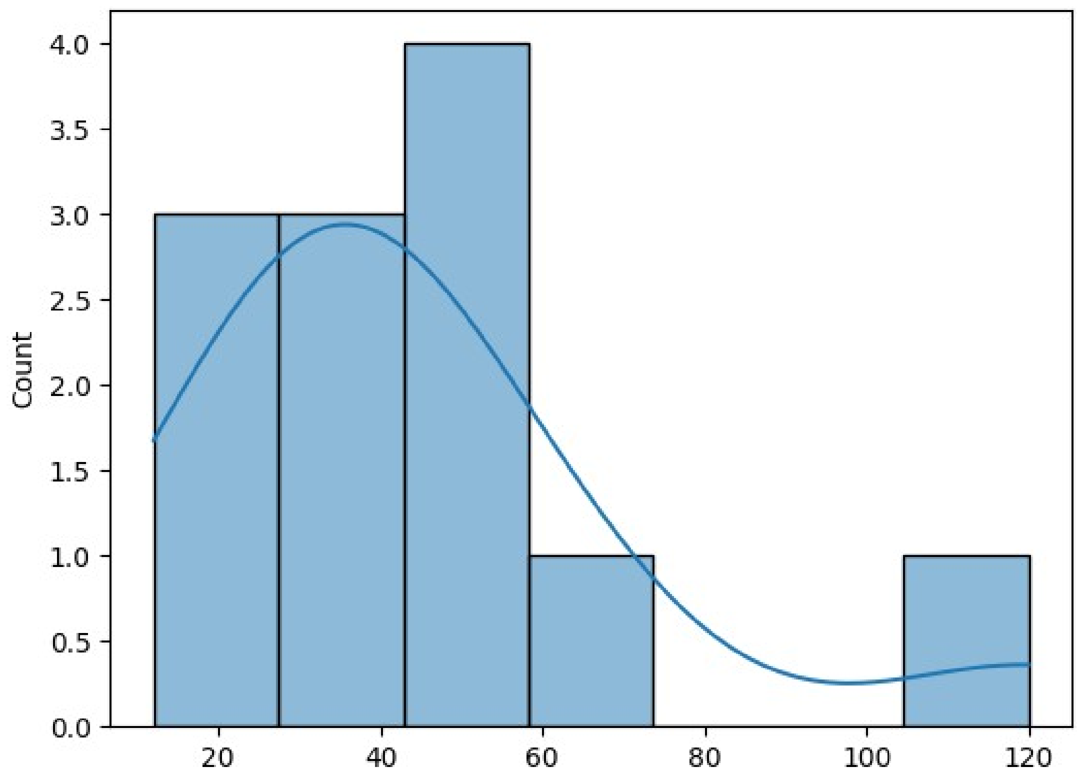
```
<Axes: ylabel='Count'>
```



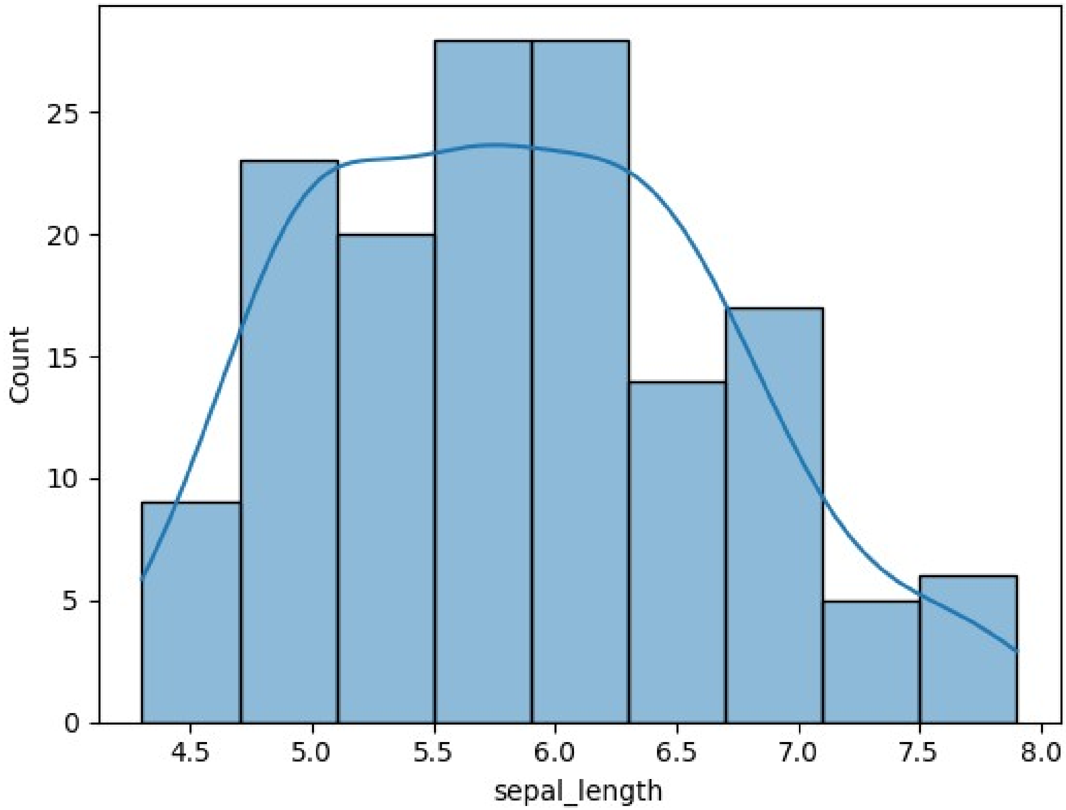

```
#ages = [ 23,24,32,45,12,43,67,45,32,56,32] kde = Kernel Density
Estimate | PDF
sns.histplot(ages, kde =True)

<Axes: ylabel='Count'>
```



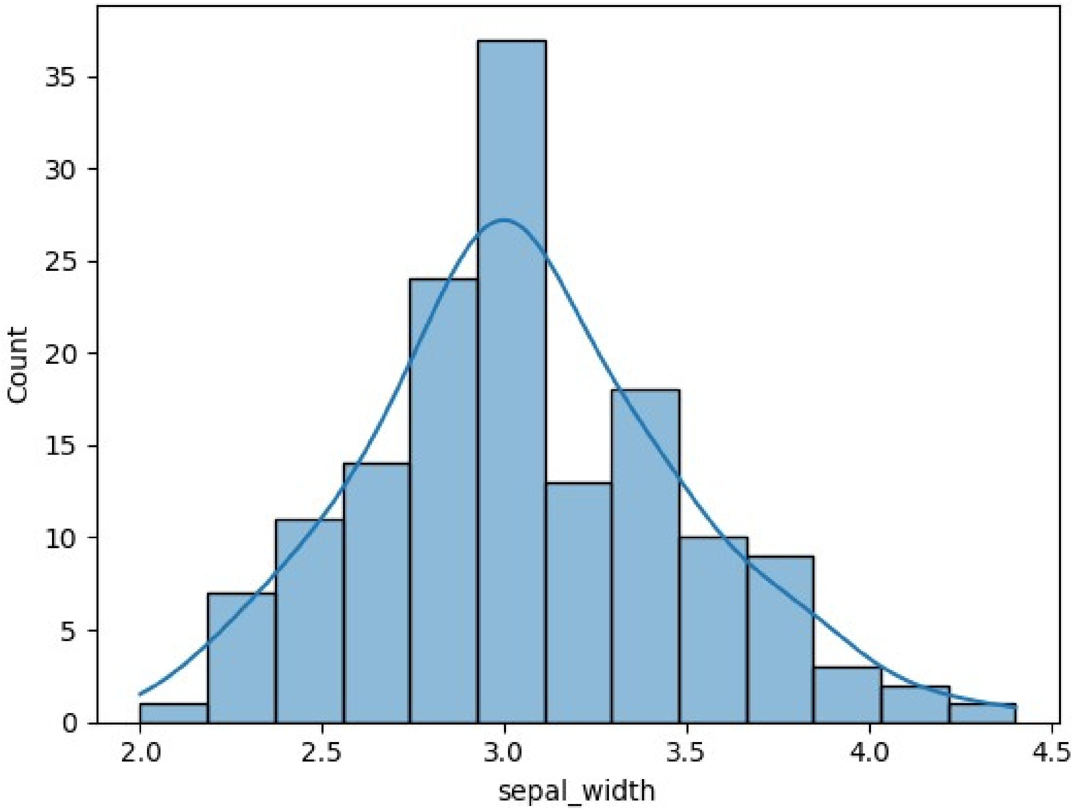

```
ages = [ 23,24,32,45,12,43,67,45,32,56,32,120]

sns.histplot(ages, kde = True). # log normal distribution

<Axes: ylabel='Count'>
```




```
df = sns.load_dataset("iris")

df.head()

   sepal_length  sepal_width  petal_length  petal_width species
0           5.1          3.5           1.4          0.2  setosa
1           4.9          3.0           1.4          0.2  setosa
2           4.7          3.2           1.3          0.2  setosa
3           4.6          3.1           1.5          0.2  setosa
4           5.0          3.6           1.4          0.2  setosa

sns.histplot(df['sepal_length'], kde = True)

<Axes: xlabel='sepal_length', ylabel='Count'>
```




```
sns.histplot(df['sepal_width'],kde = True) # it is normal distibution
<Axes: xlabel='sepal_width', ylabel='Count'>
```

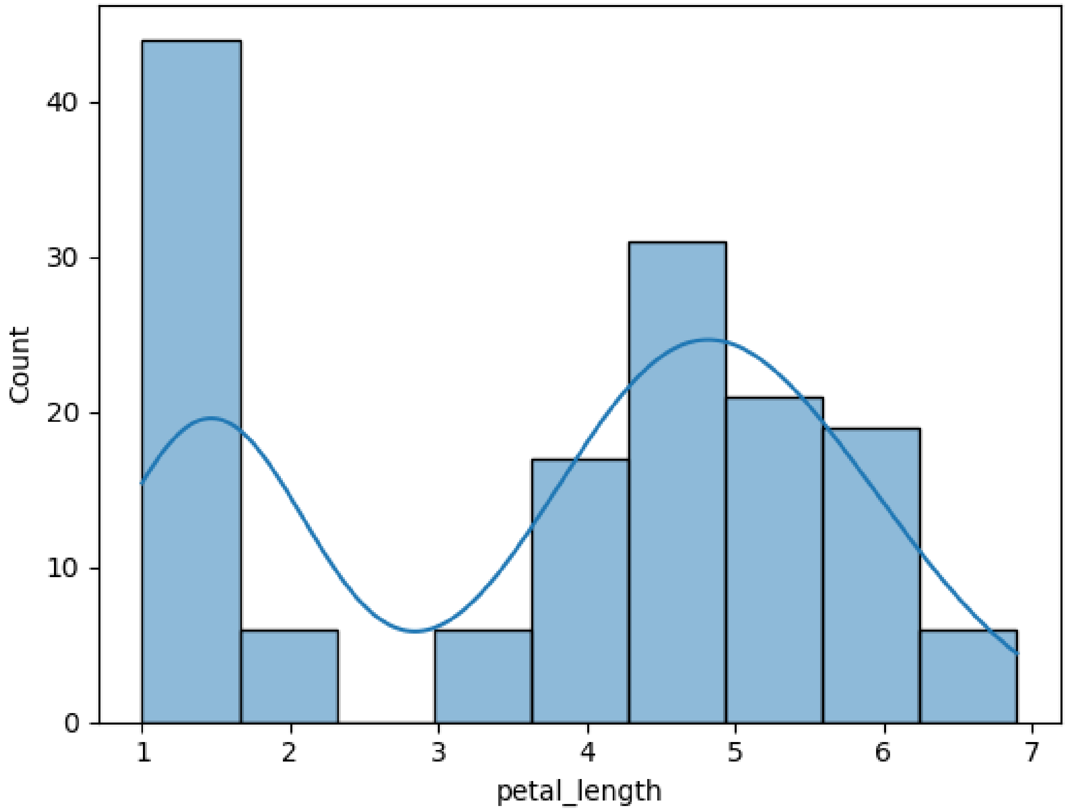



```
df.head()
```

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa

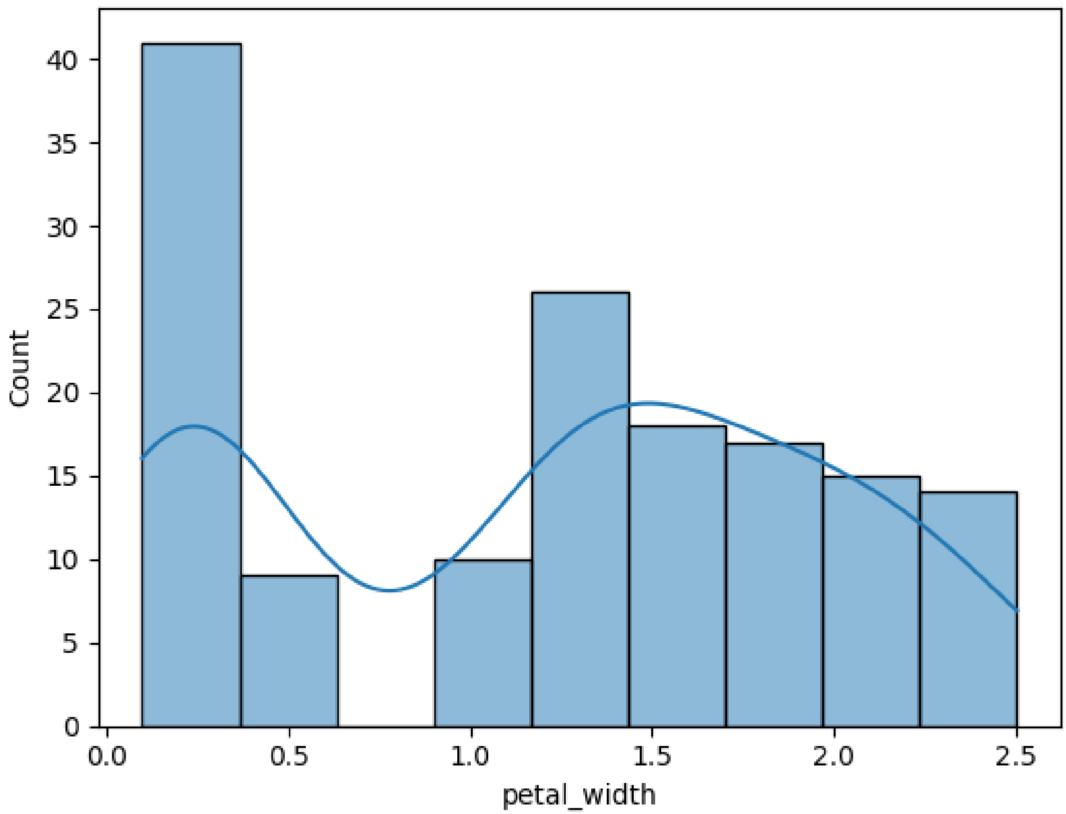
```
sns.histplot(df['petal_length'], kde = True)
```

```
<Axes: xlabel='petal_length', ylabel='Count'>
```



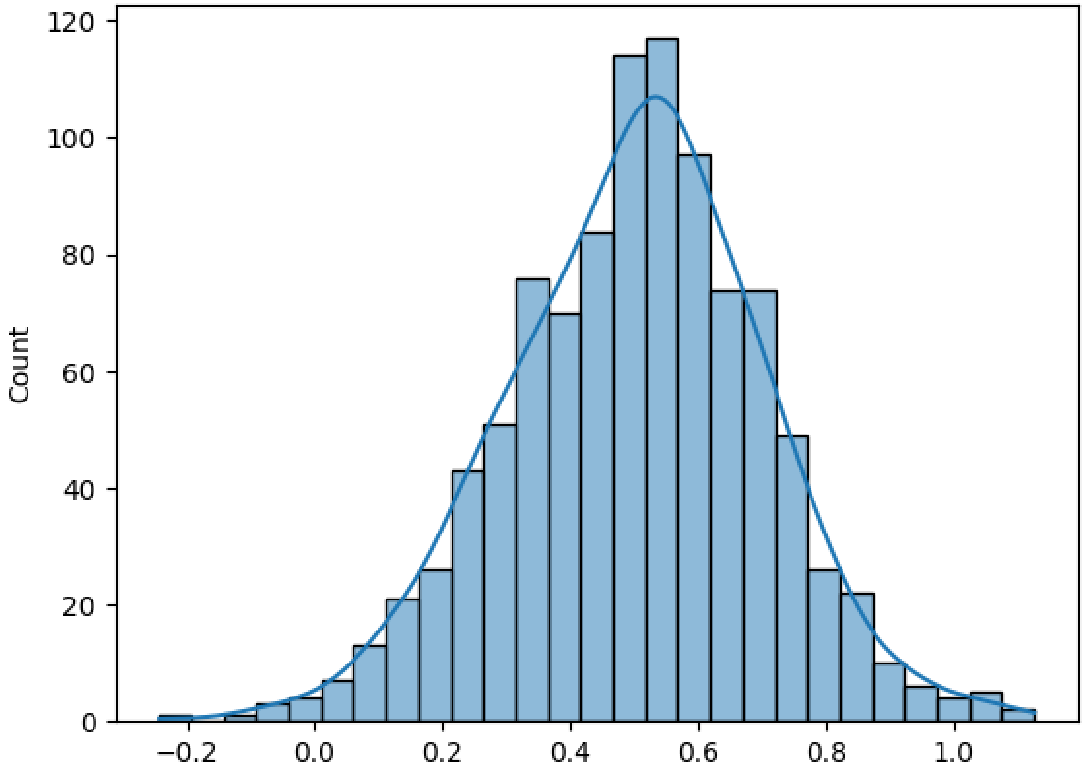

```
sns.histplot(df['petal_width'], kde = True)
```

```
<Axes: xlabel='petal_width', ylabel='Count'>
```




```
# convert normal distribution
# google - numpy .random.normal
# create a normal distribution data

s = np.random.normal(0.5,0.2,1000)
#print(s)

sns.histplot(s,kde= True)
```

```
<Axes: ylabel='Count'>
```



Other Distribution Log Normal Distribution , Power law Distribution

```
# np random log normal distribution

mu, sigma = 3.,1. # mean and standar deviation
s = np.random.lognormal(mu, sigma, 1000)

s
```

```
array([ 43.853207  ,   9.62312239,  70.91190899,  29.07311265,
        13.38187769,  22.38393775,   9.96748331,  23.62784938,
         7.17838463,  80.79426698,   7.41040567,   9.11021442,
        12.61631365,  83.58002563,  27.78469286,  27.85982515,
        34.50744553,  16.72386635,  26.959632  ,  90.7181819 ,
        16.11022621, 100.75959721,  12.27838583,  47.77684431,
        42.9162097 ,   9.32179558,  25.57514805,   2.30682948,
       132.36999743,   3.4738994 ,  29.43966136,   1.68286549,
       130.52357222,   5.51348392,   5.12367037,  13.3487401 ,
       186.4008455 ,  24.74947993,   1.72628913,   3.04066657,
         4.9288148 ,  47.89164665,  15.97625265,  22.53974951,
        17.97729033,  13.53619277,  28.23841505,   5.37226468,
       134.35152164,  34.09188503,  11.1379022 ,  32.60994995,
        45.04575669,  37.20881391,  31.84881845,   7.71232637,
        22.67047829,  16.67549296,  24.40716415,  14.03304244,
        50.05427642,  49.93247848,  53.89982729,  37.81789153,
        23.68142555, 165.24940932,  33.72255982,  59.44053031,
```

```
         3.18181129,  11.68026104, 257.40595294,  24.47173204,
        16.78447894,  16.42905478,  10.08208211,  19.0987747 ,
       113.98158277,   7.13497087,  25.86328801,  46.41779531,
        67.57101258, 161.24455085,   4.22209751,   8.7003203 ,
        17.59962698,  27.76770401,  20.47563395,  76.8292436 ,
        54.3227235 ,  47.81280469, 149.75616362,  26.23496263,
        10.36912437,  29.05819519,  12.90296425, 115.67935433,
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        61.63225755,   5.23682405,  13.29060969,  46.06673675,
        43.97173811,   5.14191039,  15.61387771,   7.38420874,
        12.11280329,  44.49485795,  36.29876331,  33.65688991,
        37.84509966,   7.45430395,  12.63042268,   7.97667837,
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        16.84381512,  13.66550288,  12.14015959,  72.80357457,
        37.87853357,  25.29921143,  44.00966039,  36.63651784,
         2.5053588 ,   3.8597774 ,  41.1481813 ,  10.7995152 ,
         7.85722945,  38.56497833,   9.78623534,   1.42172702,
         4.46659475,  42.50261699,  56.98321372,  47.04184119,
        29.3779738 ,  88.14460328,  57.72710852,  41.48284514,
        46.71038465,   5.38728652,  22.06052638,  51.5033417 ,
         3.62120414,   3.61303532,   5.79619653,  52.45471921,
        24.1239062 ,  25.27082761,  20.83280615,   9.21981578,
        83.96689416,   3.82671592,  16.02471946,  64.54654769,
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       135.23472681,   9.16992601,  12.55193406,  50.32457257,
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```

```
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        92.04398487,  30.56432624,  19.87431831,  58.27663779,
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```

```
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```

```
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```

```
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        50.62731932,   9.00090592, 168.34652027,  15.39754524,
        18.97047344,  58.01530884,  14.23237081,  20.60309964,
         4.13953638,  26.27093428,  17.39455734,  12.09288115,
        15.79950412,  12.19834146,  11.81225059,  52.19312768,
        14.17272975,   2.57139329,  58.84959394,  63.182104  ,
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        71.43900594,   8.07445325,   9.27516614,  45.59336644,
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         9.80000232,  11.18237412,  15.87165253,  10.66245813,
         5.91080187,  25.0520691 ,  14.17963973,  17.04428478,
        13.92548889,  21.15767486,  22.139256  ,  17.61427332,
         6.58193807,  14.76357931,  10.10720015,   2.56303133,
        35.88830611,  28.80153246,  12.71228208,   8.32015753])
```
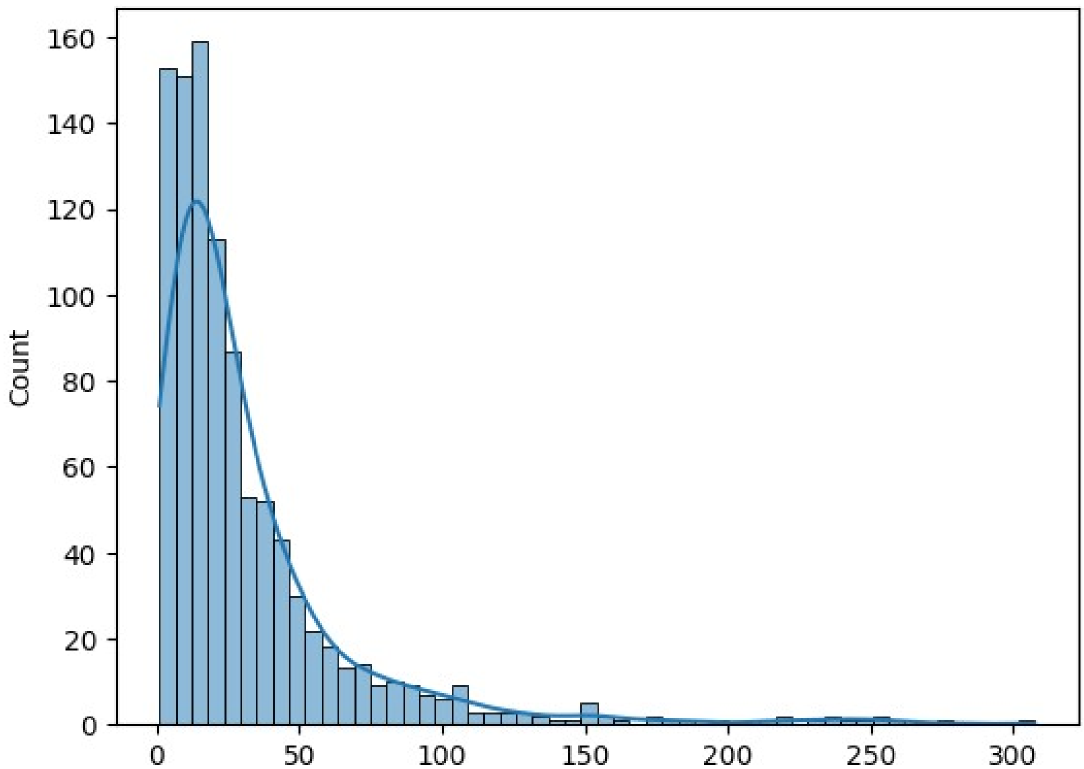
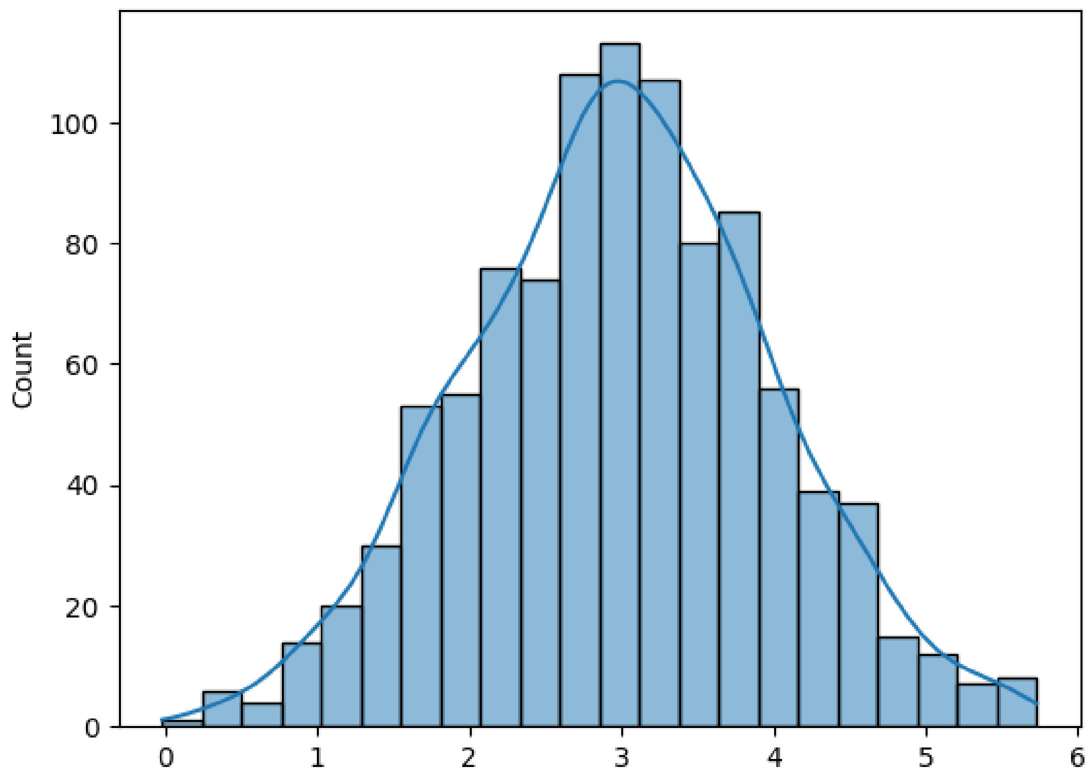

```
sns.histplot(s, kde =True)
```

```
<Axes: ylabel='Count'>
```

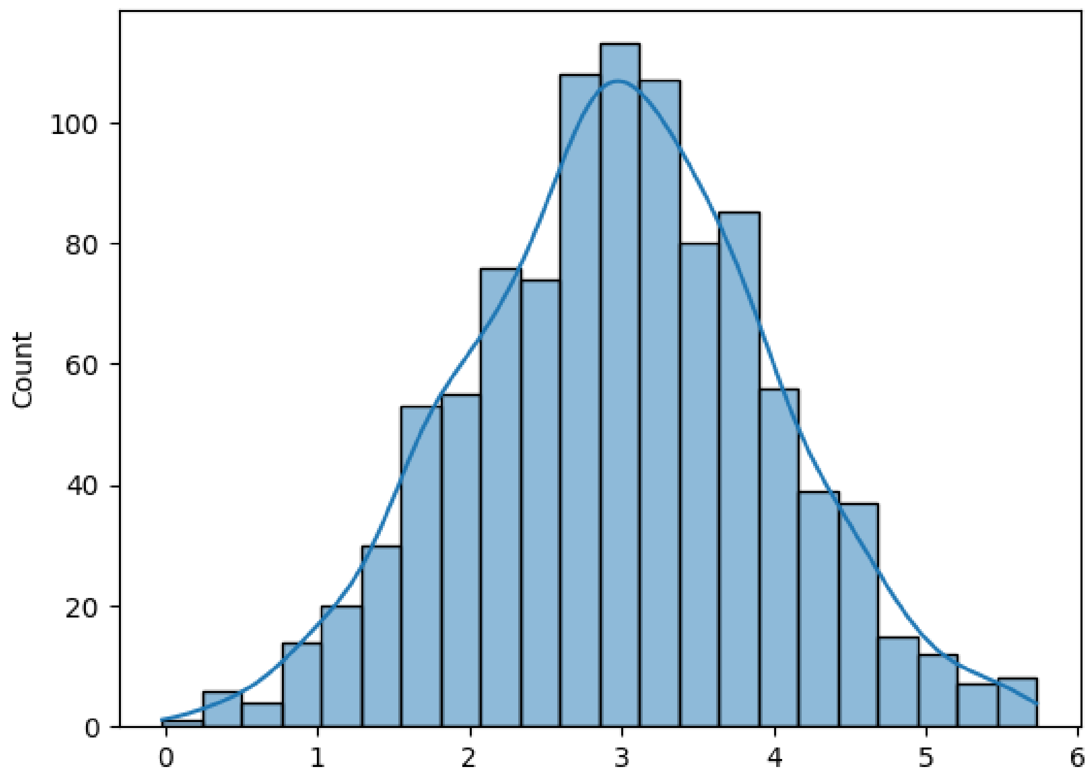



```
# Log distributio to normal distribution
sns.histplot(np.log(s), kde = True)

<Axes: ylabel='Count'>
```



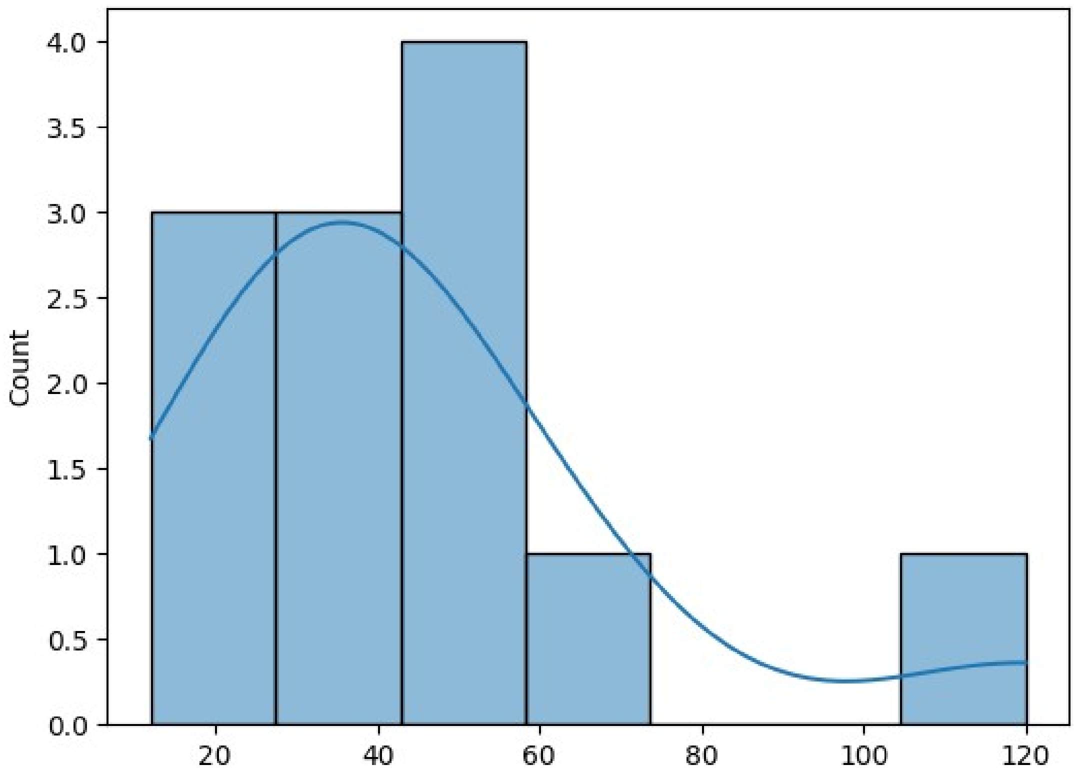

```
# log to normal distribution
sns.histplot(np.log(s), kde =True)
```

```
<Axes: ylabel='Count'>
```



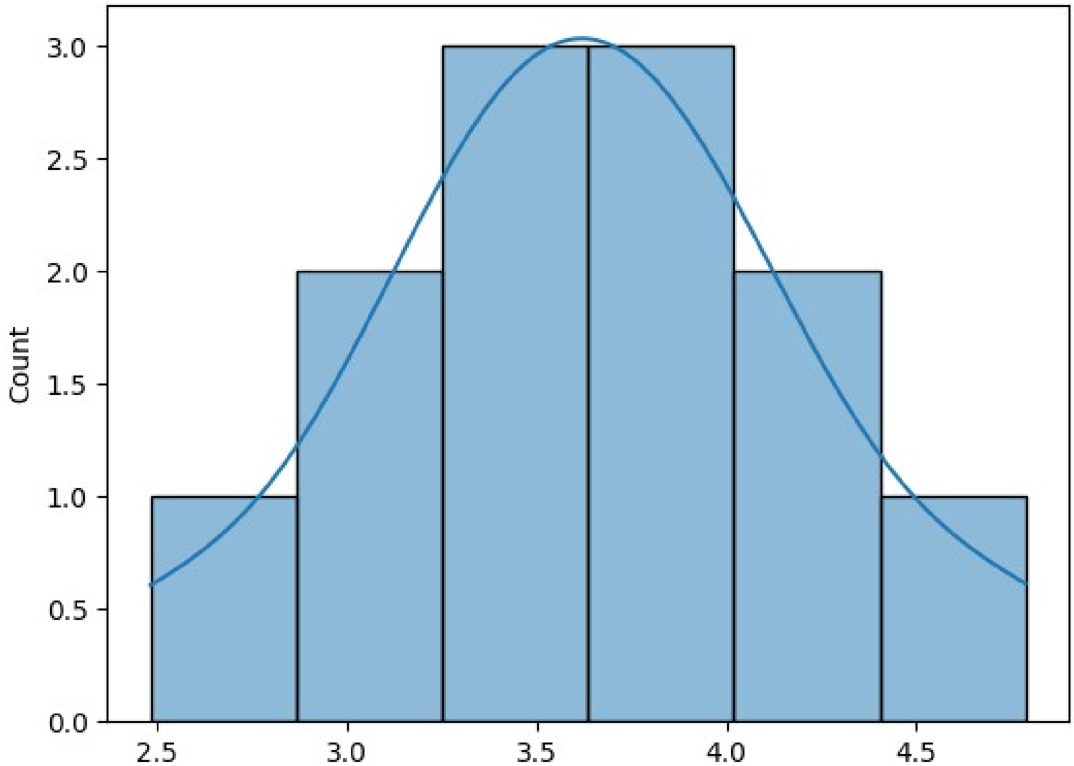

```
sns.histplot(ages, kde =True)
```

```
<Axes: ylabel='Count'>
```



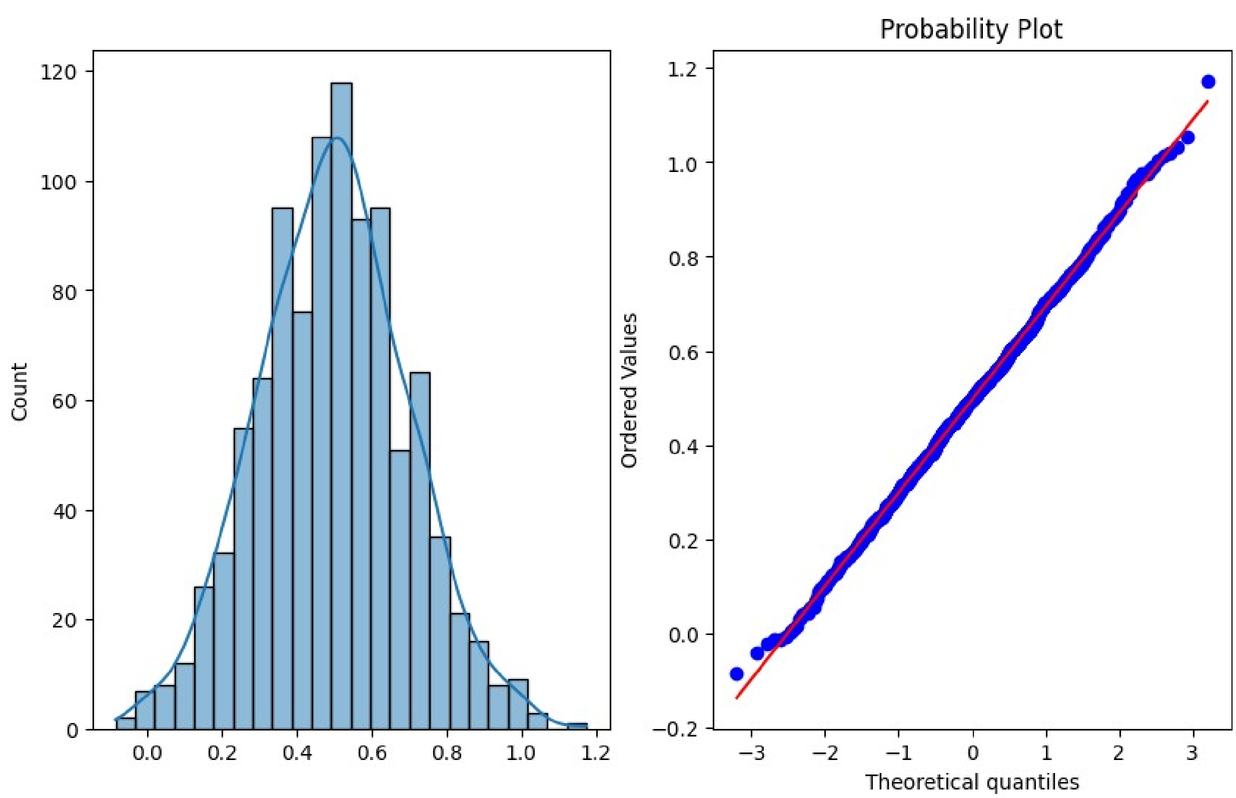

```
# convert to normal distribution | it is called data transformation techinque
sns.histplot(np.log(ages), kde =True)
```

```
<Axes: ylabel='Count'>
```




```
# Check data is normal distribution is not ?

! pip install scipy

Collecting scipy
  Downloading scipy-1.17.0-cp312-cp312-macosx_14_0_arm64.whl.metadata
(62 kB)
Requirement already satisfied: numpy<2.7,>=1.26.4 in
/opt/anaconda3/envs/jub/lib/python3.12/site-packages (from scipy)
(2.4.0)
Downloading scipy-1.17.0-cp312-cp312-macosx_14_0_arm64.whl (20.1 MB)
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 20.1/20.1 MB 8.7 MB/s
0:00:02 eta 0:00:01[36m0:00:01

! pip install scipy

Requirement already satisfied: scipy in
/opt/anaconda3/envs/jub/lib/python3.12/site-packages (1.17.0)
Requirement already satisfied: numpy<2.7,>=1.26.4 in
/opt/anaconda3/envs/jub/lib/python3.12/site-packages (from scipy)
(2.4.0)

#### Q -Q plot
import matplotlib.pyplot as plt
import scipy.stats as stat
import pylab
```

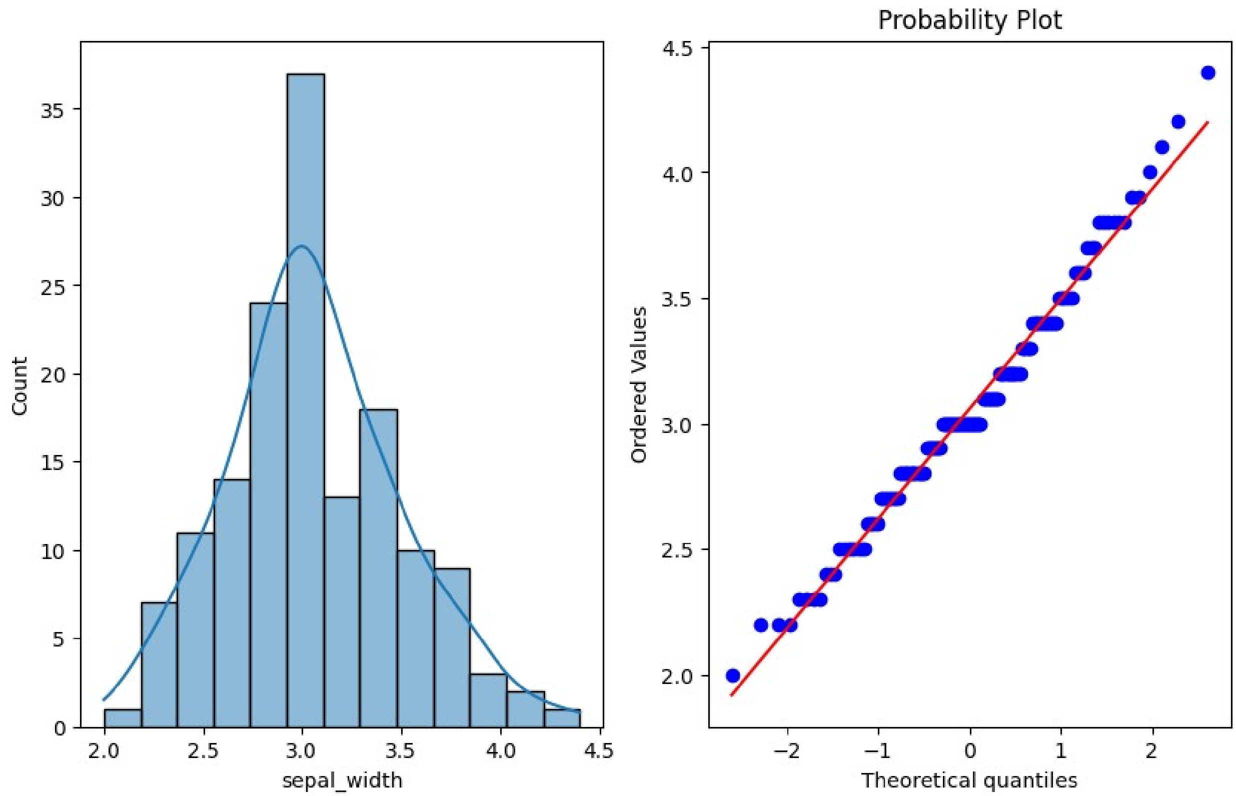
```
def plot_data(sample):
    plt:figure(figsize=(10,6))
    plt.subplot(1,2,1)
    sns.histplot(sample)
    plt.subplot(1,2,2)
    stat.probplot(sample, dist = 'norm' , plot =pylba)
    plt.show()

#### Q-Q plot
import matplotlib.pyplot as plt
import scipy.stats as stat
import pylab
def plot_data(sample):
    plt.figure(figsize=(10,6))
    plt.subplot(1,2,1)
    sns.histplot(sample,kde=True)
    plt.subplot(1,2,2)
    stat.probplot(sample,dist='norm',plot=pylab)
    plt.show()

# create a normal distributed data
s = np.random.normal(0.5,0.2,1000)

plot_data(s)
```



```
df.head()
```

```
   sepal_length  sepal_width  petal_length  petal_width species
0           5.1          3.5           1.4          0.2  setosa
1           4.9          3.0           1.4          0.2  setosa
2           4.7          3.2           1.3          0.2  setosa
3           4.6          3.1           1.5          0.2  setosa
4           5.0          3.6           1.4          0.2  setosa
```

```
df['sepal_width']
plot_data(df['sepal_width'])
```




```
# correlatio one data connection to another data.
```

area, nroom, price ,owner_name

price is the - >tartet future / cloumns area, nroom -> input feature /cloumns

it is called supervise model

```
df = sns.load_dataset('tips')

df.head()
```

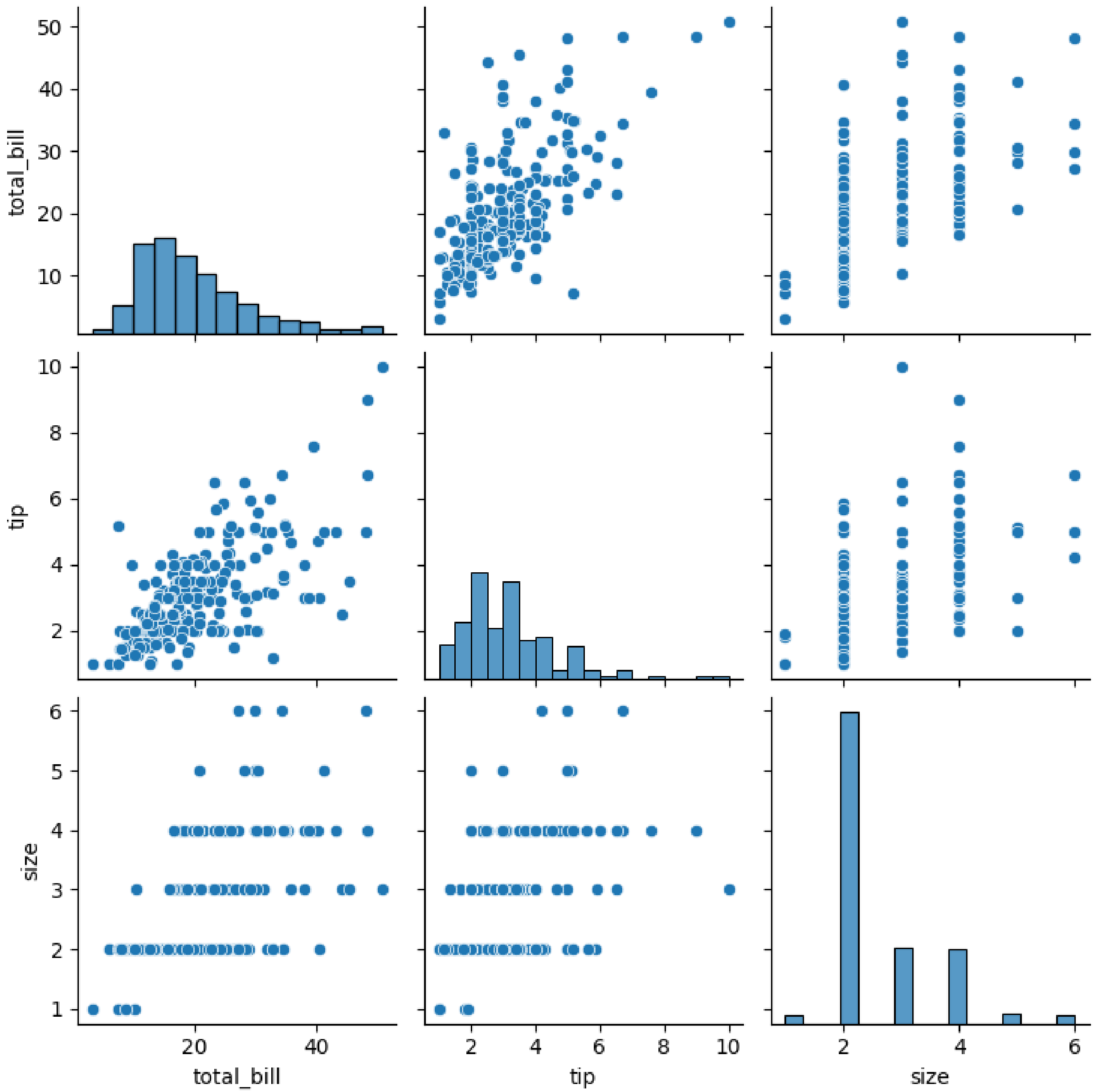
```
   total_bill   tip     sex smoker  day    time  size
0       16.99  1.01  Female     No  Sun  Dinner     2
1       10.34  1.66    Male     No  Sun  Dinner     3
2       21.01  3.50    Male     No  Sun  Dinner     3
3       23.68  3.31    Male     No  Sun  Dinner     2
4       24.59  3.61  Female     No  Sun  Dinner     4
```

```python
# How to perfor corr from the google | corr value 0 to 1 . o mean no,
df.corr(numeric_only = True)
```

```
            total_bill       tip      size
total_bill    1.000000  0.675734  0.598315
tip           0.675734  1.000000  0.489299
size          0.598315  0.489299  1.000000
```

```python
# pariplot show graph:

sns.pairplot(df)
```

```
<seaborn.axisgrid.PairGrid at 0x152d8c7d0>
```



total_bill
tip
size
total_bill
tip
size