In [1]: `## PDF probability Distribution Function/ Probability Distribution Function`

In [2]: `data= [23,24,32,45,12,43,67,45,32,56,32]`

In [3]: `data`
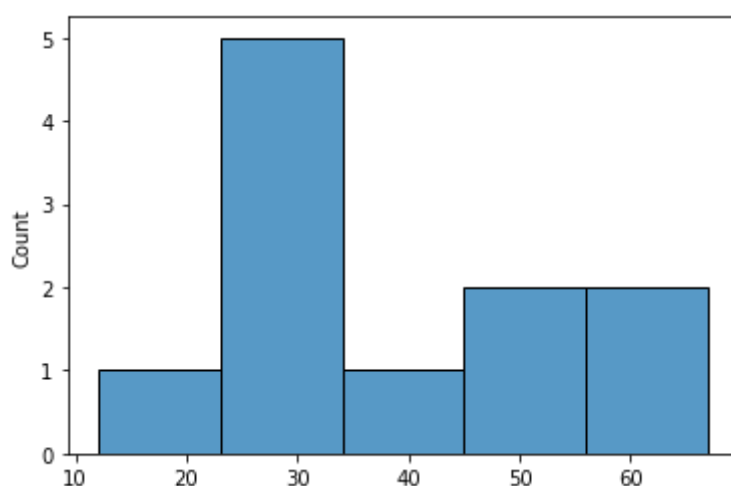
Out[3]: `[23, 24, 32, 45, 12, 43, 67, 45, 32, 56, 32]`

In [4]: `import seaborn as sns`

In [6]: `sns.histplot(data)`

Out[6]: `<AxesSubplot:ylabel='Count'>`

In [9]: `data_copy= data.copy()`

In [10]: `data_copy`

Out[10]: `[23, 24, 32, 45, 12, 43, 67, 45, 32, 56, 32]`

In [11]: `data_copy.sort()`

In [12]: `data_copy`

Out[12]: `[12, 23, 24, 32, 32, 32, 43, 45, 45, 56, 67]`

In [21]: `data_copy.append(179)`

In [22]: `data_copy`

Out[22]: `[12, 23, 24, 32, 32, 32, 43, 45, 45, 56, 67, 179]`

In [23]: `data_copy.append(210)`

In [24]: `data_copy`

Out[24]: `[12, 23, 24, 32, 32, 32, 43, 45, 45, 56, 67, 179, 210]`

In [25]: `data_copy.append(289)`

In [26]: `data_copy`

Out[26]: `[12, 23, 24, 32, 32, 32, 43, 45, 45, 56, 67, 179, 210, 289]`

In [28]:
```python
data_copy2 = data.copy()
```

In [29]: `data_copy2`

Out[29]: `[23, 24, 32, 45, 12, 43, 67, 45, 32, 56, 32]`

In [30]:
```python
data_copy2[0]= -10
```
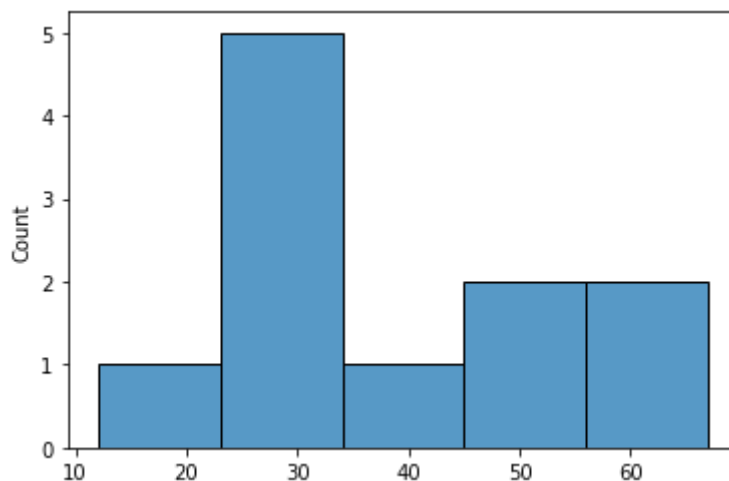
In [33]:
```python
data_copy2[1]= -75
```

In [34]: `data_copy2`

Out[34]: `[-10, -75, 32, 45, 12, 43, 67, 45, 32, 56, 32]`

In [13]:
```python
## KDE kernal density estimation
```

In [36]:
```python
sns.histplot(data)
```

Out[36]: `<AxesSubplot:ylabel='Count'>`

In [14]:
```python
sns.histplot(data, kde= True)
```

Out[14]: `<AxesSubplot:ylabel='Count'>`
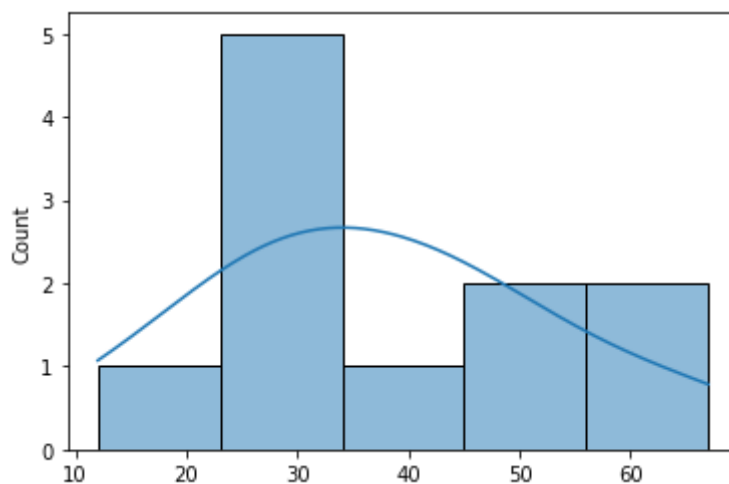
In [37]:
```python
sns.histplot(data_copy)
```

Out[37]:
```
<AxesSubplot:ylabel='Count'>
```
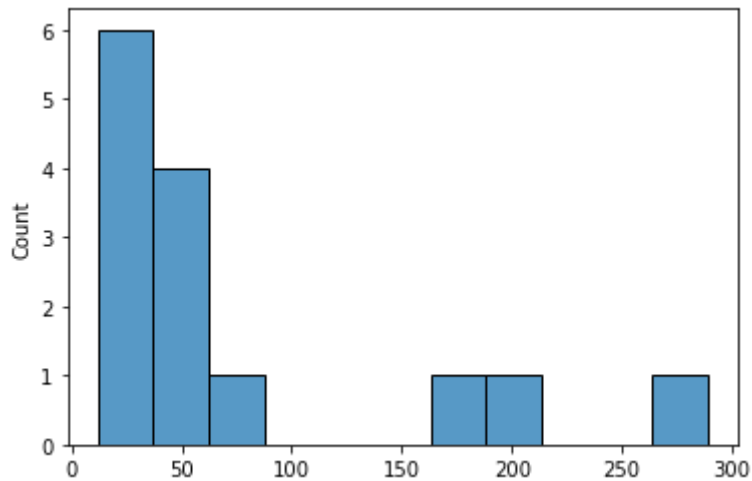

In [27]:
```python
sns.histplot(data_copy, kde= True)
```

Out[27]:
```
<AxesSubplot:ylabel='Count'>
```


In [ ]:
```python
## with the outlires the data is right skewed
```

In [38]:
```python
sns.histplot(data_copy2)
```
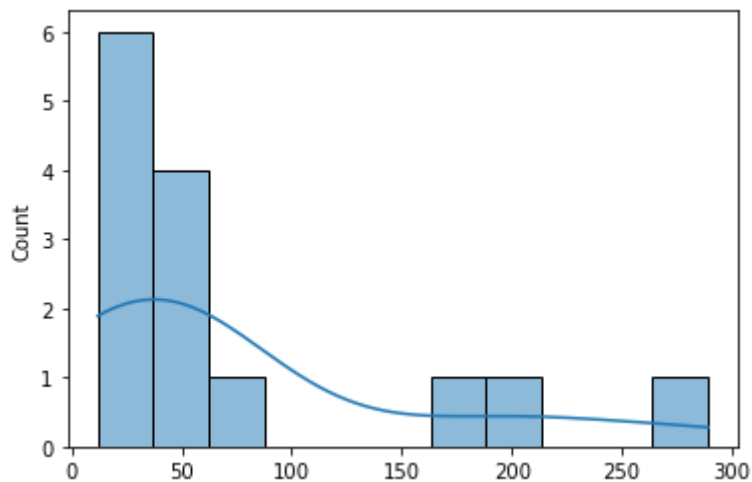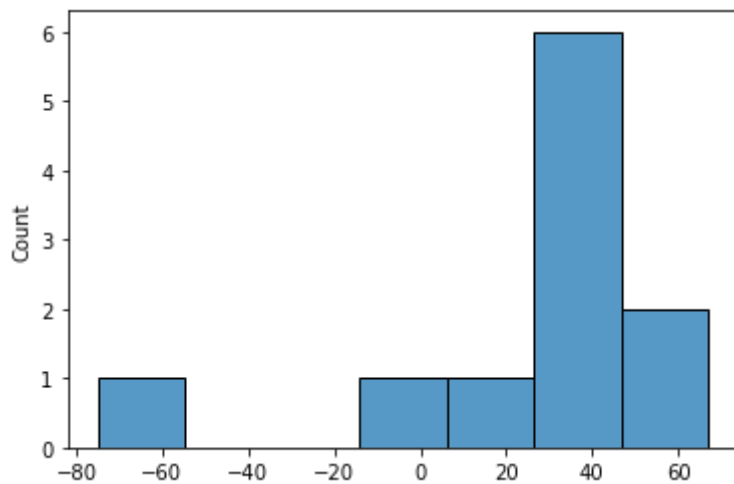
Out[38]:
```
<AxesSubplot:ylabel='Count'>
```

In [35]:
```python
sns.histplot(data_copy2, kde= True)
```

Out[35]:
```
<AxesSubplot:ylabel='Count'>
```
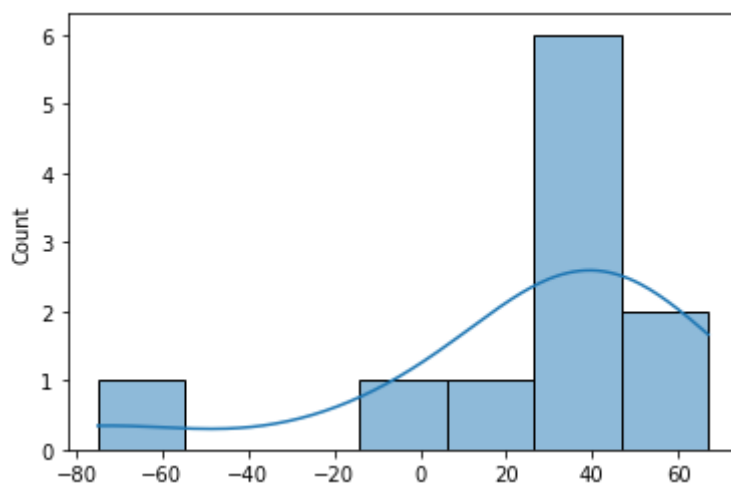

In [ ]:
```python
## with the outlires the data is left skewed
```

In [15]:
```python
import pandas as pd
data2= pd.read_csv("https://raw.githubusercontent.com/sunnysavita10/Statistics-Witl
```

In [16]:
```python
data2
```

Out[16]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...	...
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 6 columns

In [18]:
```python
sns.histplot(data2["SepalLengthCm"], kde= True)
```

Out[18]:
```
<AxesSubplot:xlabel='SepalLengthCm', ylabel='Count'>
```
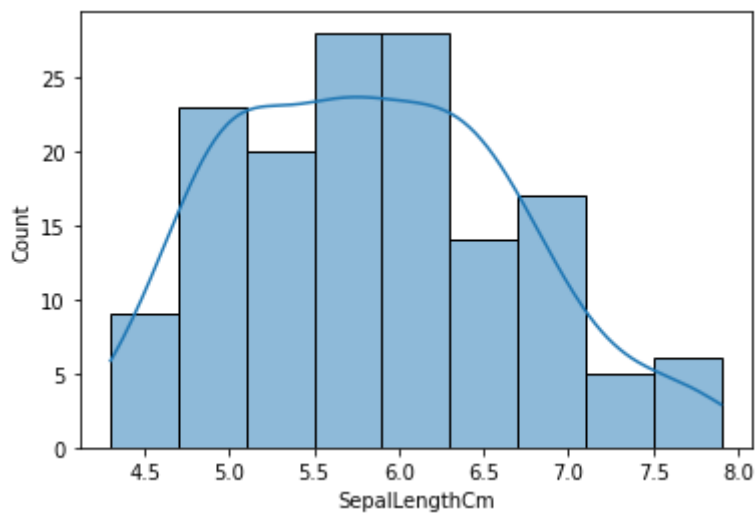
```
In [51]:    ## convert it to normal distribution
```

```
In [52]:    sns.histplot(np.log(data2["SepalLengthCm"]), kde= True)
```

```
Out[52]:    <AxesSubplot:xlabel='SepalLengthCm', ylabel='Count'>
```
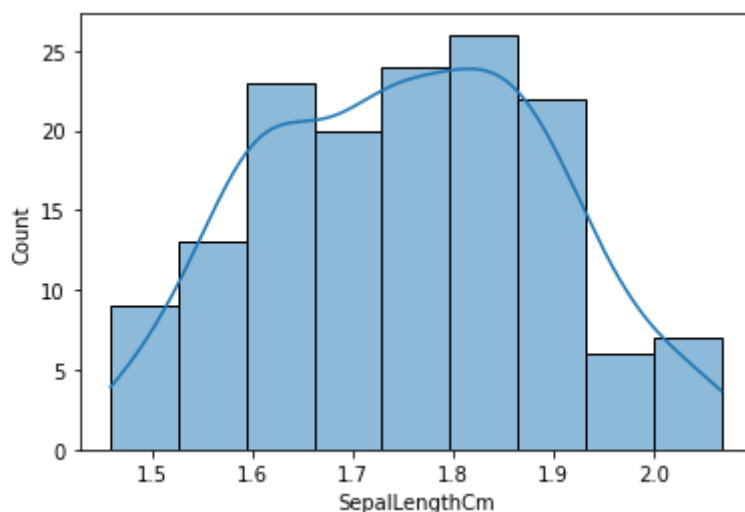


```
In [ ]:    ## we are not able to get the bell shaped curve which means data is not converted i
           ##converting
```

```
In [19]:    sns.histplot(data2["SepalWidthCm"], kde= True)
```

```
Out[19]:    <AxesSubplot:xlabel='SepalWidthCm', ylabel='Count'>
```
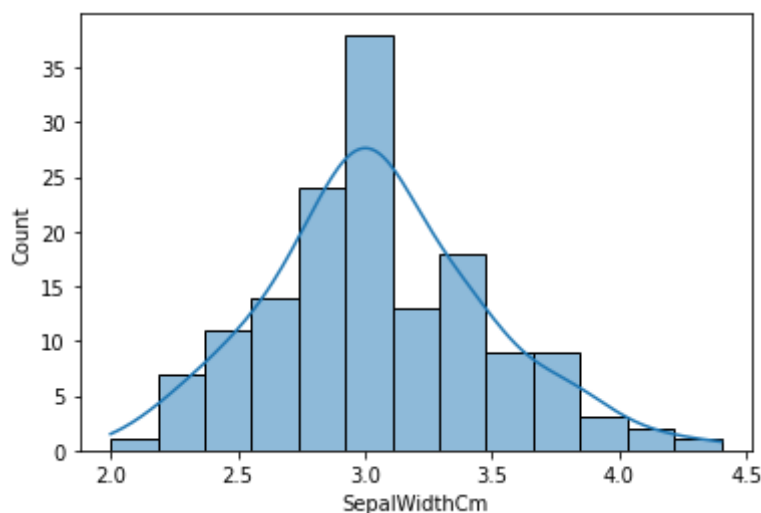
In [20]:
```python
sns.histplot(data2["PetalLengthCm"], kde= True)
```

Out[20]:
```
<AxesSubplot:xlabel='PetalLengthCm', ylabel='Count'>
```
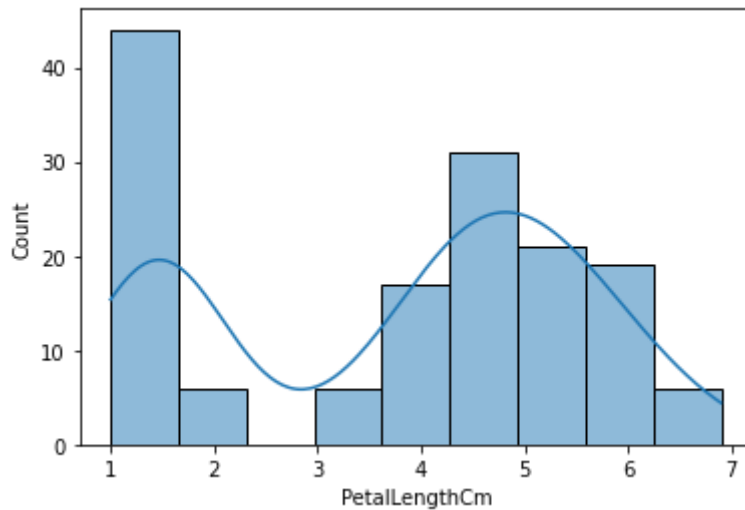

In [39]:
```python
sns.histplot(data2["PetalWidthCm"], kde= True)
```

Out[39]:
```
<AxesSubplot:xlabel='PetalWidthCm', ylabel='Count'>
```
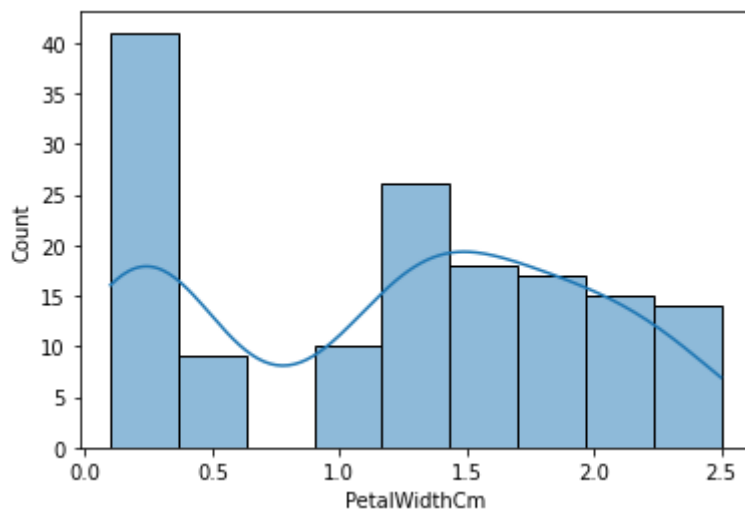

In [40]:
```python
import numpy as np
```

In [42]:
```python
nor= np.random.normal(0.5,0.2,1000)
```

In [43]:
```python
nor
```

```
Out[43]:  array([ 4.87632762e-01,  3.43872863e-01, -5.06939928e-02,  3.00548079e-01,
                  6.68351640e-01,  5.66321321e-01,  8.31053356e-01, -7.38691122e-02,
                  2.64888914e-01,  2.82717172e-01,  3.27623728e-01,  2.66124773e-01,
                  7.23793628e-01,  4.93104087e-01,  6.11426868e-01,  6.72455300e-01,
                  6.60241904e-01,  7.50233220e-01,  5.43042510e-01,  5.51067006e-01,
                  3.65466894e-01,  5.97194522e-01,  2.41019810e-01, -1.14935768e-01,
                  7.28629887e-01,  4.02061478e-01,  3.29992493e-01,  6.72578862e-01,
                  3.15278379e-01,  5.69728253e-01,  6.37816517e-01,  4.71018806e-01,
                  2.79244488e-01,  6.37886782e-01,  7.37919866e-01,  4.32021487e-01,
                  3.66709977e-01,  8.87415744e-01,  6.18105492e-01,  5.18342584e-01,
                  4.30950726e-01,  4.54404214e-01,  6.05549845e-01,  6.95565424e-01,
                  5.03676199e-01,  5.12309233e-01,  4.44758851e-01,  8.86962095e-01,
                  8.03193546e-01,  7.64663424e-01,  5.83197105e-01,  3.37033327e-01,
                  2.28944748e-01,  3.30081767e-01,  2.72531636e-01,  1.46968880e-01,
                  3.59117220e-01,  5.00826880e-01,  4.02327845e-01,  6.11184428e-01,
                  4.28630916e-01,  4.37383107e-01,  4.96714494e-01,  4.26311331e-01,
                  5.51545776e-01,  7.71034070e-01,  3.30386607e-01,  7.54827460e-01,
                  7.04000304e-01,  6.14945755e-01,  6.60318104e-01,  5.54385397e-01,
                  8.24537956e-01,  4.61458814e-01,  3.62781757e-01,  4.74637061e-01,
                  4.09404305e-01,  7.21246117e-01,  6.49104345e-01,  5.33485572e-01,
                  5.74482338e-01,  7.20475830e-01,  8.85686758e-01,  5.82618771e-01,
                  5.22842232e-01,  7.71415687e-01,  5.48166012e-01,  8.69176951e-01,
                  6.01096126e-01,  4.93536515e-01,  4.99972735e-01,  6.29137269e-01,
                  2.66660517e-01,  7.85268925e-01,  4.86237940e-01,  6.46101459e-01,
                  4.93335881e-01,  5.28034336e-01,  6.44482919e-01,  5.31338678e-01,
                  5.15913835e-01,  6.06481229e-01,  3.39923532e-01,  7.97251962e-01,
                  6.01606568e-02,  2.39543402e-01,  2.90308411e-01,  7.53245156e-01,
                  6.13929905e-01,  5.48257964e-01,  6.06501954e-01,  5.33196336e-01,
                  8.59653575e-01,  6.59241352e-01,  3.51728448e-01,  3.89976716e-01,
                  1.40865694e-01,  7.10538249e-01,  5.84186779e-01,  1.83837122e-01,
                  7.94393015e-01,  4.06766212e-01,  6.09995599e-01,  2.81293695e-01,
                  2.88465469e-01,  6.57560928e-01,  5.72440253e-01,  3.80976276e-01,
                  8.39107075e-01,  5.73718779e-01,  5.84546543e-01,  5.08102506e-01,
                  3.89560354e-01,  4.88734329e-01,  5.09346924e-01,  6.58637837e-01,
                  3.87158510e-01,  5.89919326e-01,  6.33734164e-01,  5.23240117e-01,
                  6.67174864e-01,  3.80601715e-01,  6.98401088e-01,  3.37806107e-01,
                  5.64503161e-01,  8.19779813e-01,  6.06858034e-01,  4.91420379e-01,
                  7.03900161e-01,  7.00240933e-01,  1.93979433e-01,  5.94776818e-01,
                  5.90508934e-01,  3.33674121e-01,  8.77060259e-01,  8.71369486e-01,
                  6.12066293e-01,  1.44976252e-01,  7.27534691e-01,  7.20446953e-01,
                  4.32350422e-01,  3.46332725e-01,  5.48789006e-01,  4.51957714e-01,
                  5.31901149e-01,  6.66081795e-01,  4.02852209e-01,  7.47662192e-01,
                  2.78992725e-01,  5.62407308e-01,  4.57088474e-01,  5.88655740e-01,
                  3.94063310e-01,  7.49958426e-02,  7.30462637e-01,  3.77157740e-01,
                  5.54159920e-01,  5.15169924e-01,  5.87030373e-01,  5.55158589e-01,
                  7.34859501e-01,  1.62687288e-01,  7.66696553e-01,  8.22901703e-01,
                  4.24071650e-01,  2.20353089e-01,  6.81769004e-01,  5.06461284e-01,
                  8.76659500e-01,  1.74495957e-01,  5.46408574e-01,  5.66683453e-01,
                  6.49900984e-01,  6.63505799e-01,  6.63166793e-01,  1.68191688e-01,
                  8.91558138e-01,  9.34134111e-01,  3.58181682e-01,  5.65453006e-01,
                  6.77900688e-01,  6.06387427e-01,  6.75656076e-01,  6.58880926e-01,
                  4.44593443e-01,  3.75317221e-01,  5.00666953e-01,  5.07803290e-01,
                  3.27136167e-01,  2.03766939e-01,  6.40636489e-01,  8.97350283e-01,
                  1.91165244e-01,  3.30104335e-01,  1.95669000e-01,  2.19146282e-01,
                  4.41721389e-01,  7.68083279e-01,  3.99202411e-02,  4.23621251e-01,
                  1.00571534e+00,  4.68815572e-01,  1.00299856e+00,  6.32822878e-01,
                  8.68229210e-01,  5.51286121e-01,  5.86143655e-01,  6.50687921e-01,
                 -7.85009162e-02,  4.35612122e-01,  5.72185286e-01,  6.44620635e-01,
                  1.90437879e-01,  3.87463985e-01,  6.09032052e-01,  7.04595840e-01,
                  7.71832830e-01,  8.33874936e-01,  2.46748494e-01,  7.35860775e-01,
                  3.77610215e-01,  7.57897723e-01,  5.98069111e-01,  4.53054104e-01,
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                  5.89166790e-02,  4.90393826e-01,  5.20835604e-01,  5.22212723e-01,
                  6.82617373e-01,  2.83287169e-01,  8.16861763e-01,  4.59499184e-01,
```

```
       3.21000747e-01,   5.50669018e-01,   8.29811601e-01,   9.13328434e-01,
       5.30709428e-01,   3.44157062e-01,   1.15281632e-01,   2.19762648e-01,
       5.62676776e-01,   1.23330353e-01,   4.34698663e-01,   2.97324405e-01,
       3.97122573e-01,   3.56163712e-01,   1.08510997e+00,   7.05137562e-01,
       2.87415970e-04,   4.31135665e-01,   6.35721655e-01,   3.96755470e-01,
       4.01161925e-01,   6.54627095e-01,   2.65554374e-01,   5.80701298e-01,
       7.18960812e-01,   1.94079829e-01,   2.85640084e-01,   6.09764610e-01,
       7.62238906e-01,   3.71034131e-01,   8.28938112e-01,   2.84526031e-01,
       9.06196823e-01,   6.34648808e-01,   5.35817137e-01,   4.94967161e-01,
       7.26266471e-03,   4.72407541e-01,   3.12693061e-01,   2.68754987e-01,
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       3.19459300e-01,   2.00670760e-01,   4.36232906e-01,   4.06476213e-01,
       4.46639263e-01,   6.40185963e-01,   7.72622502e-01,   3.81028158e-01,
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       6.23209874e-01,   6.24414390e-01,   1.84834640e-02,   4.39031340e-01,
       5.89393208e-01,   4.32397440e-01,   2.86552334e-01,   5.25445670e-01,
       4.40337163e-01,   3.57917756e-01,   3.84496264e-01,   6.64676106e-01,
       8.73278406e-01,   8.84467618e-01,   5.03950630e-01,   6.32878577e-01,
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       7.88431000e-01,   5.33816815e-01,   6.90836424e-01,   4.55268088e-01,
       7.66222537e-02,   3.04144282e-01,   6.03077217e-01,   2.13119647e-01,
       6.61611686e-01,   6.35216221e-01,   4.17468453e-01,   6.43271321e-01,
       1.02613999e+00,   6.47412770e-01,   5.01993017e-01,   3.74681545e-01,
       7.07542682e-01,   5.13712034e-01,  -5.83012514e-02,   5.75121129e-01,
       7.81234675e-01,   7.23008817e-01,   4.08362584e-01,   6.72161233e-01,
       6.58971862e-01,   4.62864328e-01,   4.48176940e-01,   8.07386682e-01,
       4.79603485e-01,   3.06634783e-01,   4.91679286e-01,   2.68362133e-01,
       6.04525145e-01,   4.62732316e-01,   4.36347186e-01,  -2.99301611e-01,
       5.85098202e-01,   2.45585929e-01,   5.03182631e-01,   6.05422213e-01,
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       7.82210224e-01,   5.34890321e-01,   7.25164014e-01,   5.98086238e-01,
       7.53371543e-01,   4.67219910e-01,   6.11549894e-01,   2.62776367e-01,
       6.10073748e-01,   1.90180215e-01,   3.91975790e-01,   9.66497747e-01,
       6.52313472e-01,   6.33016751e-01,   5.51726344e-01,   6.28588805e-01,
       1.43252868e-01,   6.74041731e-01,   2.49354956e-01,   3.33290409e-01,
       3.90874854e-01,   5.02202899e-01,   4.61694304e-01,   4.49461619e-01,
       6.36719224e-01,   5.47151271e-01,   4.50367770e-01,   6.29812587e-01,
       3.85347353e-01,   1.08843115e+00,   4.80170251e-01,   3.65178566e-01,
       3.18875438e-01,   7.11593259e-01,   6.43095893e-01,   5.32461963e-01,
       2.13448408e-01,   6.43992909e-01,   3.54318331e-01,   3.27448623e-01,
       1.90824931e-01,   3.91549098e-01,   3.14077964e-01,   6.09315339e-01,
       5.77772387e-01,   6.10580220e-01,   3.72864880e-01,   7.23798397e-01,
       4.17630886e-01,   6.90432439e-03,   7.51533493e-01,   4.26525668e-01,
       5.89209624e-01,   8.89280709e-01,   6.68717415e-01,   5.28189235e-01,
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```

In [44]: `sns.histplot(nor,kde = True)`

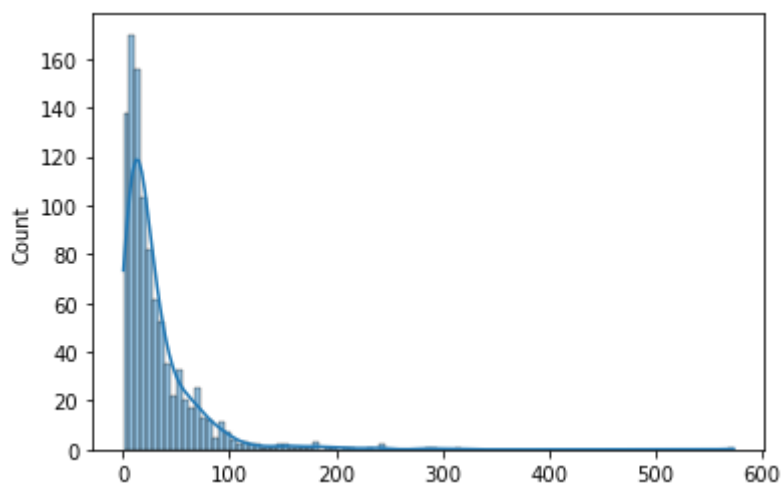Out[44]: `<AxesSubplot:ylabel='Count'>`
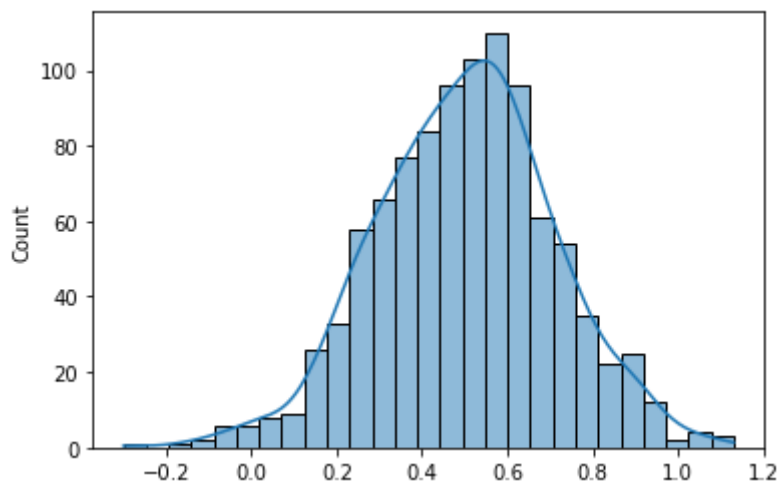
In [46]:
```python
mu,sigma = 3.0,1.0
p= np.random.lognormal(mu,sigma,1000)
```

In [47]:
```python
sns.histplot(p,kde = True)
```

Out[47]: `<AxesSubplot:ylabel='Count'>`

In [48]:
```python
## log normal distribution right skewed
```

In [49]:
```python
p
```

```
Out[49]:  array([ 21.58749002,    1.71633273,   16.6196772 ,   15.0705355 ,
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```

In [53]: `sns.histplot(np.log(p),kde = True)`

Out[53]: `<AxesSubplot:ylabel='Count'>`
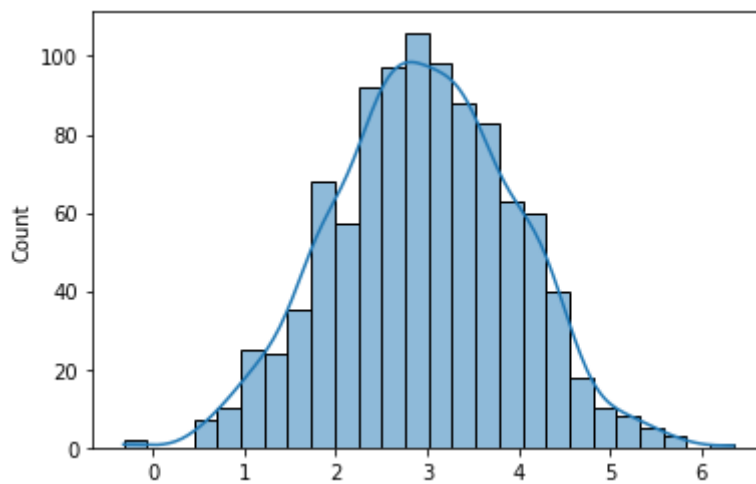
In [54]:
```python
## Technique to convert data into normal distribution
#Log Transformation
#Square-Root Transformation
#Reciprocal Transformation
#Box-Cox Transformation
```
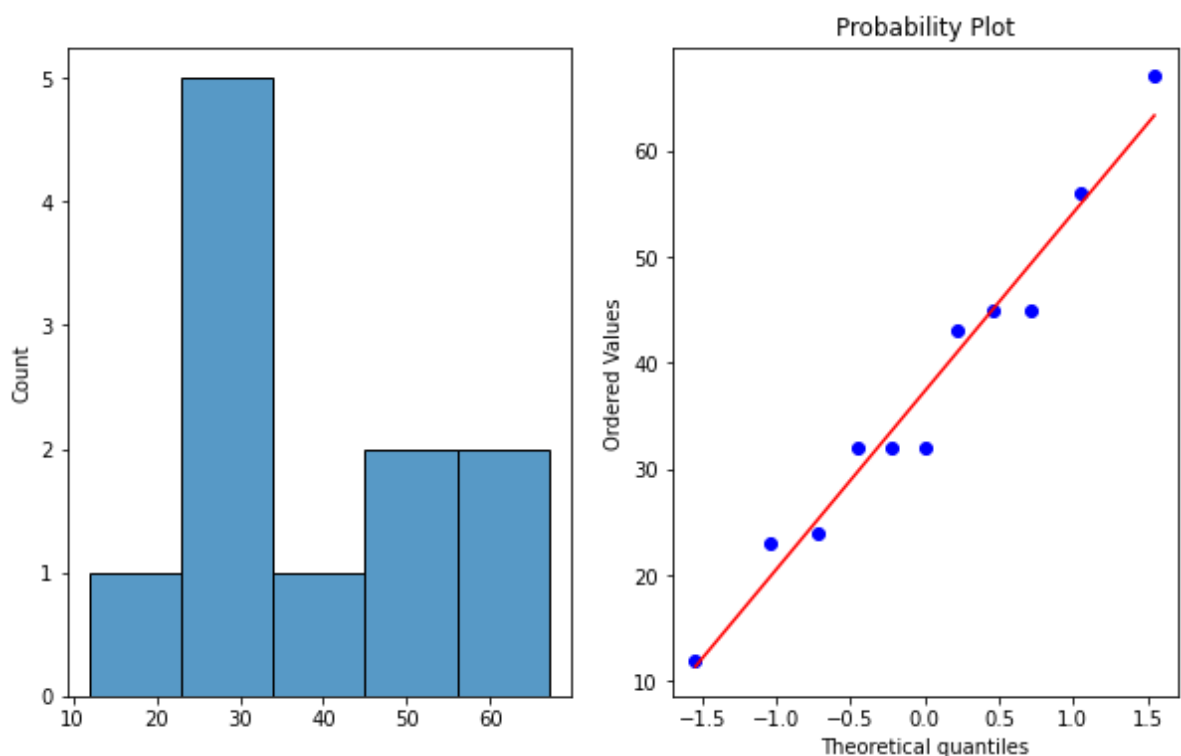
In [68]:
```python
## QQ plot Quantile-Quantile plot
```
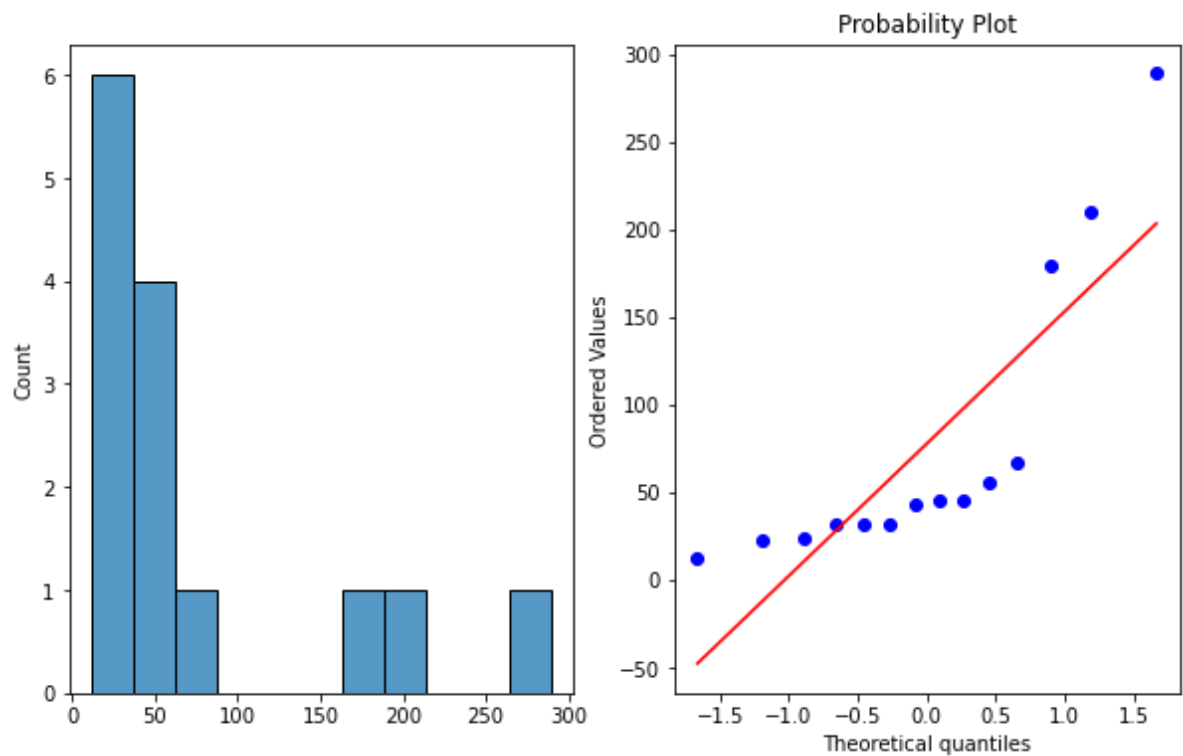
In [59]:
```python
import matplotlib.pyplot as plt
import scipy.stats as stat
import pylab
def plot_data(sample):
    plt.figure(figsize=(10,6))
    plt.subplot(1,2,1)
    sns.histplot(sample)
    plt.subplot(1,2,2)
    stat.probplot(sample,dist='norm',plot=pylab)
    plt.show
```
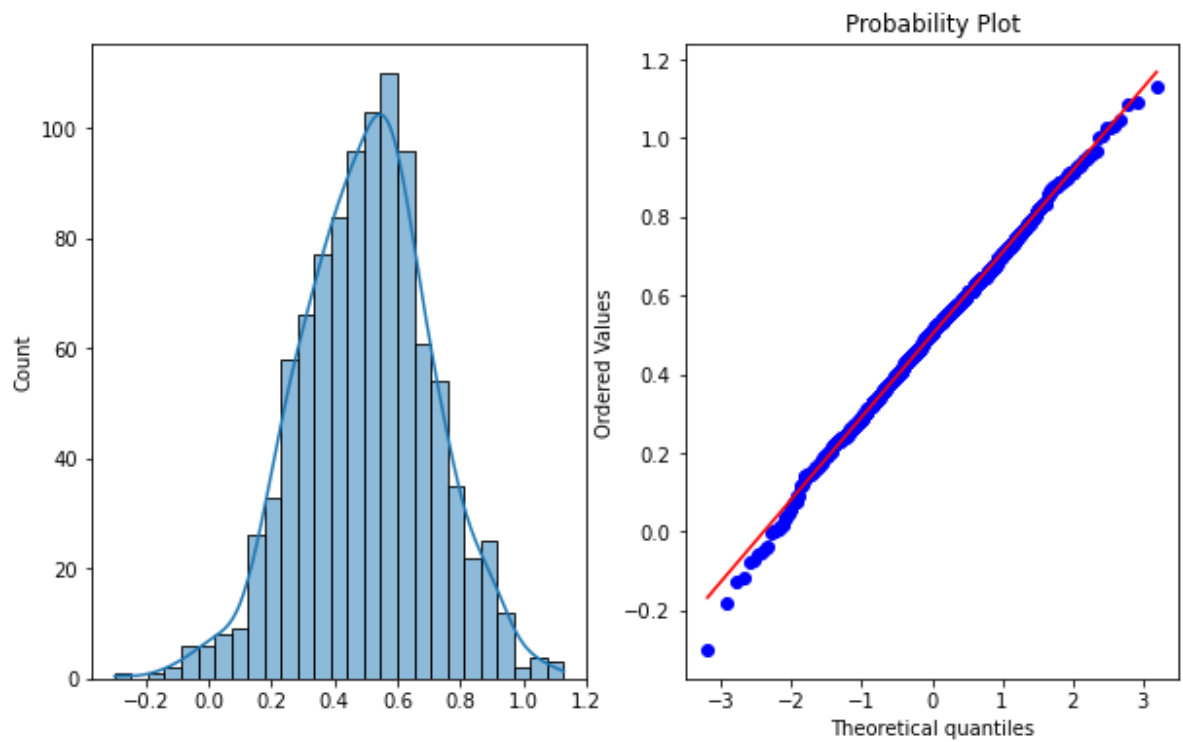
In [60]:
```python
plot_data(data)
```

In [61]: `plot_data(data_copy)`

In [62]:
```python
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
```
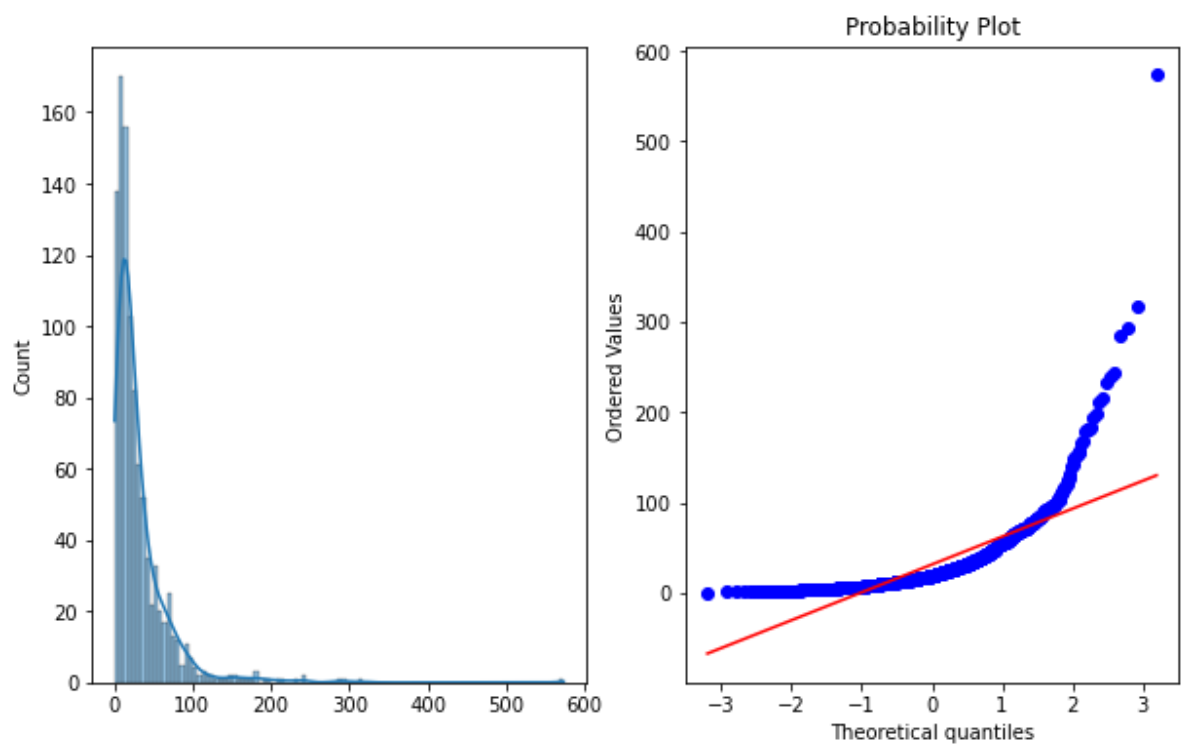
In [63]: `plot_data(data)`
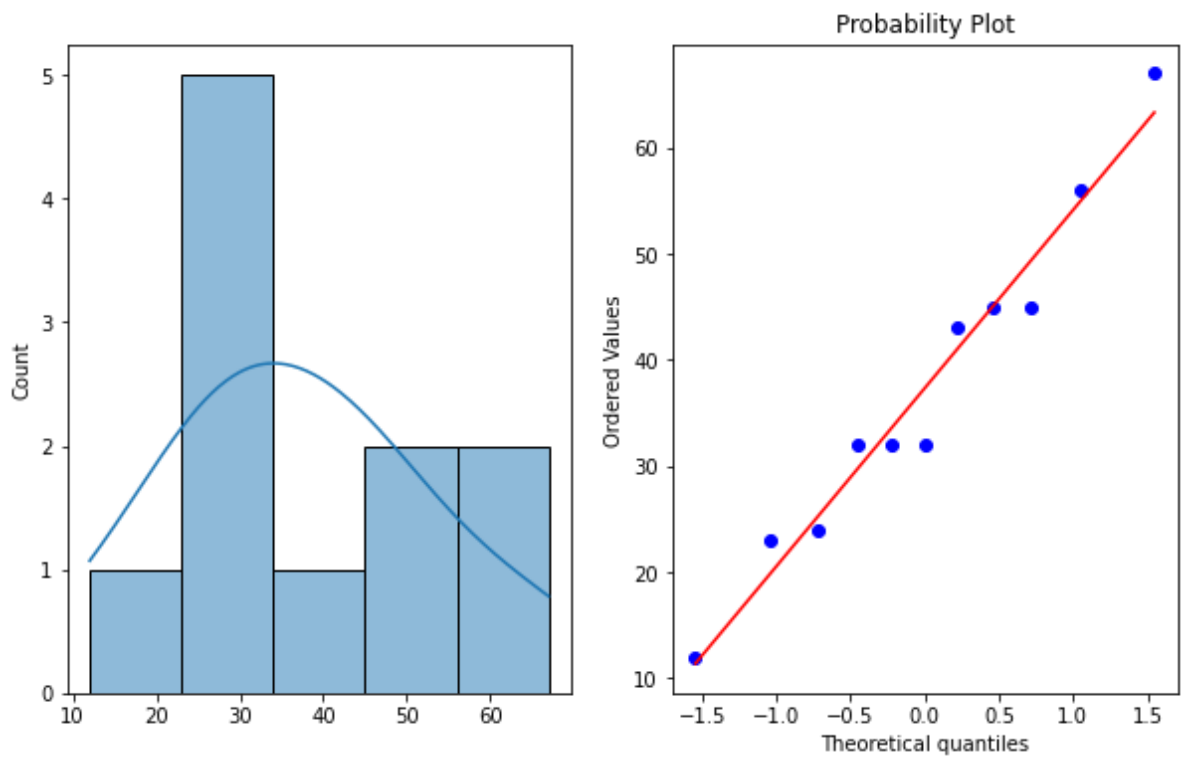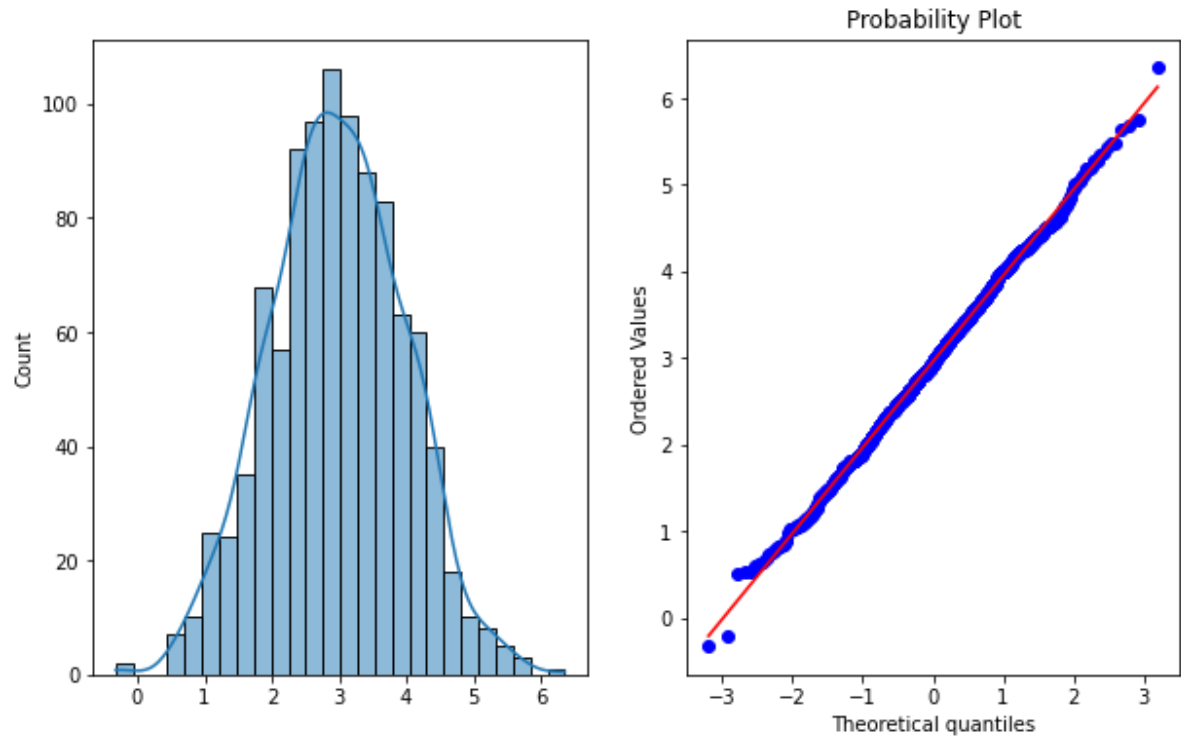
```
In [64]:  plot_data(data_copy)
```
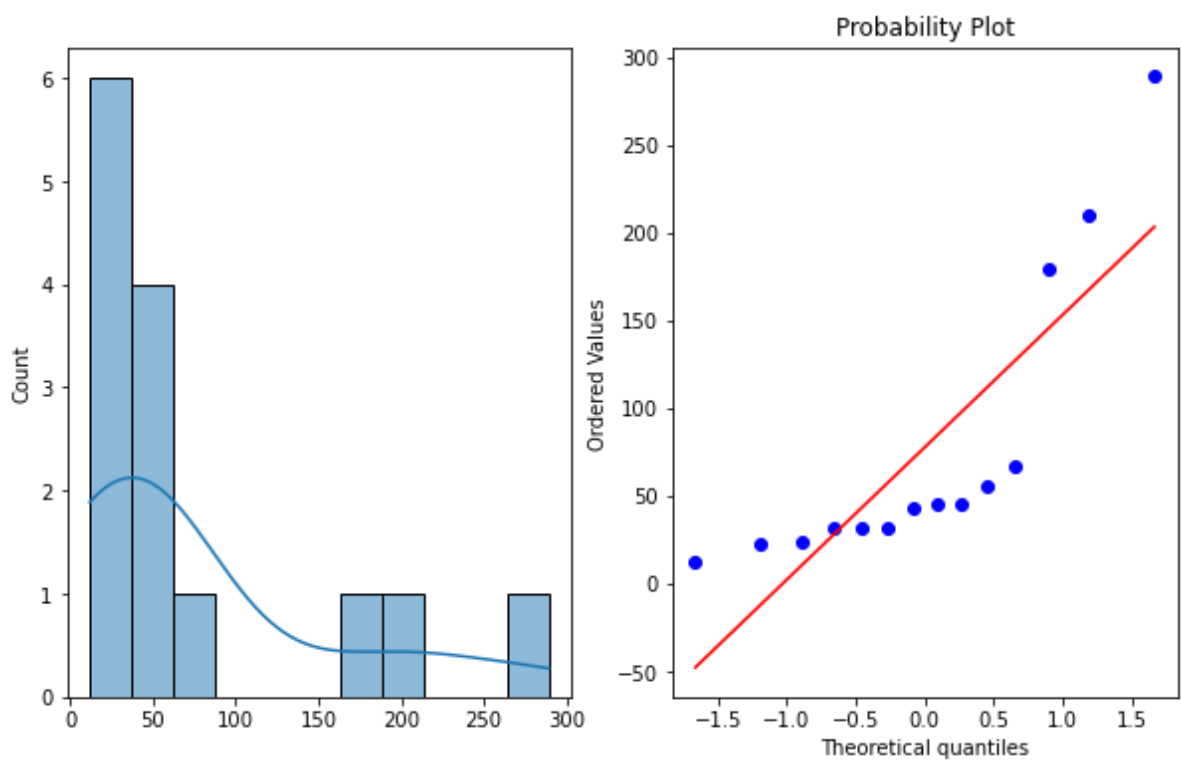


```
In [65]:  plot_data(nor)
```

`In [66]:` `plot_data(p)`

`In [67]:` `plot_data(np.log(p))`

In [ ]: