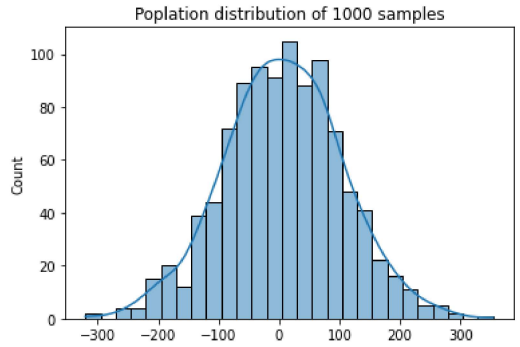
```
import random
import numpy as np
import seaborn as sns


list1=np.random.normal(4,100,1000)
#taking 30 samples from population of list1
samplemeanslist=[]
samplestdlist=[]
for i in range(1000):
  s=random.sample(sorted(list1),50)
  samplemeanslist.append(round(np.mean(s),2))
  samplestdlist.append(round(np.std(s),2))
print(samplemeanslist)
print(samplestdlist)
```

```
[-14.72, -1.7, -12.3, 1.64, 3.48, 21.31, 2.84, 0.91, 14.33, -3.96, -1.63, 22.31, -15.91, 30.27, 5.4, -6.3, 6.19, 14.94, 23.81, 1.3, 18.5
[100.79, 85.67, 96.14, 90.5, 88.48, 91.16, 104.06, 86.09, 108.56, 90.49, 104.02, 92.29, 83.51, 107.27, 97.48, 91.77, 84.53, 93.5, 84.97,
```

```
#plotting the population histogram
popmean=round(np.mean(list1),2)
popstd=round(np.std(list1),2)
sns.histplot(list1, kde=True).set(title='Poplation distribution of 1000 samples')
```

```
[Text(0.5, 1.0, 'Poplation distribution of 1000 samples')]
```

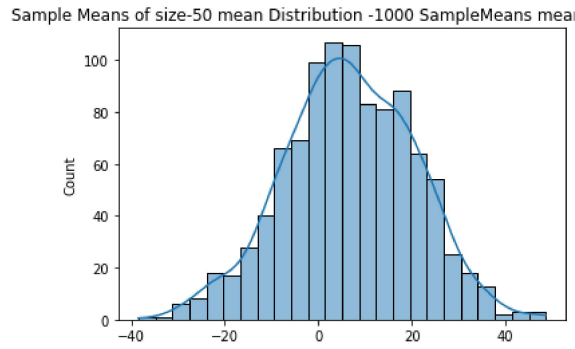



```
print('Population Mean with 1000 population size {}'.format(popmean))
print('Population Variance with 1000 population size {}'.format(popstd))
```

```
Population Mean with 1000 population size 6.72
Population Variance with 1000 population size 98.3
```

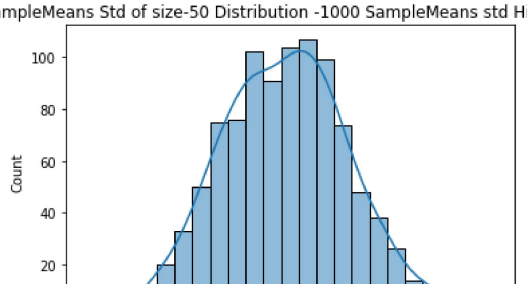
```
#plotting the sample means

sns.histplot(samplemeanslist,kde=True).set(title='Sample Means of size-50 mean Distribution -1000 SampleMeans mean Histogram')
```

```
[Text(0.5, 1.0, 'Sample Means of size-50 mean Distribution -1000 SampleMeans mean Histogram')]
```




```
sns.histplot(samplestdlist,kde=True).set(title='SampleMeans Std of size-50 Distribution -1000 SampleMeans std Histogram')
```

```
[Text(0.5, 1.0, 'SampleMeans Std of size-50 Distribution -1000 SampleMeans std Histogram')]
```




```
samplestd=np.std(samplestdlist)
print("sample_std", end=' = ')
print(samplestd)
print(popstd)
estimated_sample_std=popstd/np.sqrt(50)
print("estimated_sample_std", end=' = ')
print(estimated_sample_std)
```

```
sample_std = 9.874251865837735
98.3
estimated_sample_std = 13.901719318127524
```

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