

## EXPERIMENT-11

### Random Sampling and Sampling Distribution

Aim:

To explore random sampling from population and understand the concept of sampling distribution

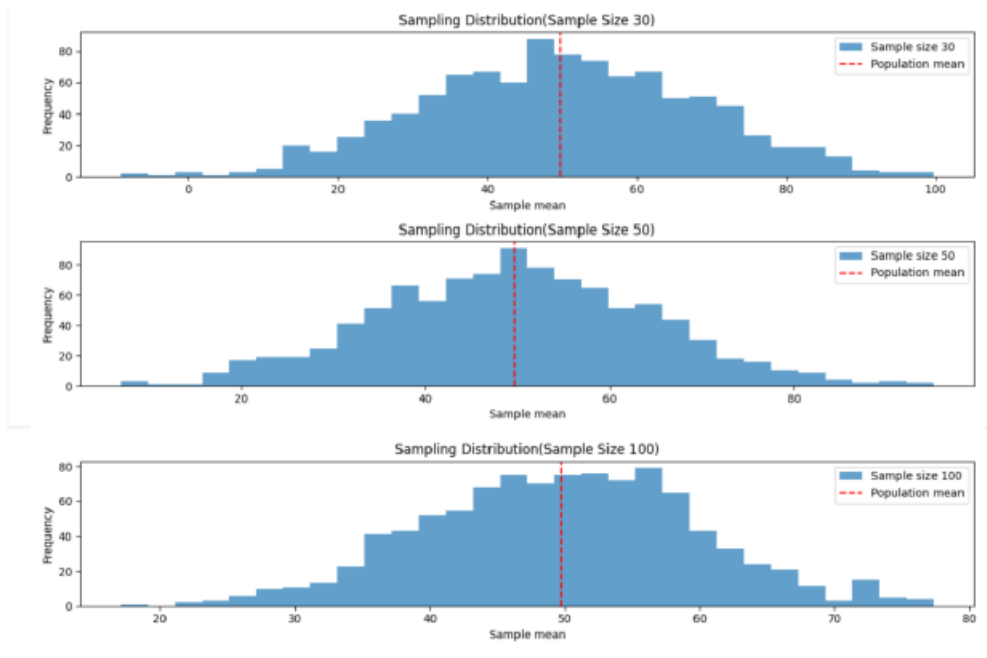
Procedure:

- Create a population of data with specified distribution
- Perform random sampling from population to create multiple sample of different sizes
- Compute sample statistics
- Plot histograms or density plots of each statistics
- Compare the sampling distribution of the sample statistic of the sample statistic with mean distribution

Program:

```
import numpy as np
import matplotlib.pyplot as plt
mean=50
std=100
size=100000
population=np.random.normal(mean,std,size)
sample=[30,50,100]
num=1000
sample_means={}
for i in sample:
    sample_means[i]=[]
    for j in range(num):
        samp=np.random.choice(population,size=i,replace=False)
        sample_means[i].append(np.mean(samp))
plt.figure(figsize=(12,8))
for i,j in enumerate(sample):
    plt.subplot(len(sample),1,1+i)
    plt.hist(sample_means[j],bins=30,alpha=0.7,label=f'Sample size {j}')
    plt.axvline(np.mean(population),color='red',linestyle='dashed',linewidth=1.5,label='Population mean')
    plt.title(f'Sampling Distribution(Sample Size {j})')
    plt.xlabel('Sample mean')
    plt.ylabel('Frequency')
    plt.legend()

plt.tight_layout()
plt.show()
```



Result:

Thus the python program for random sampling and sampling distribution is executed and output is verified successfully