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
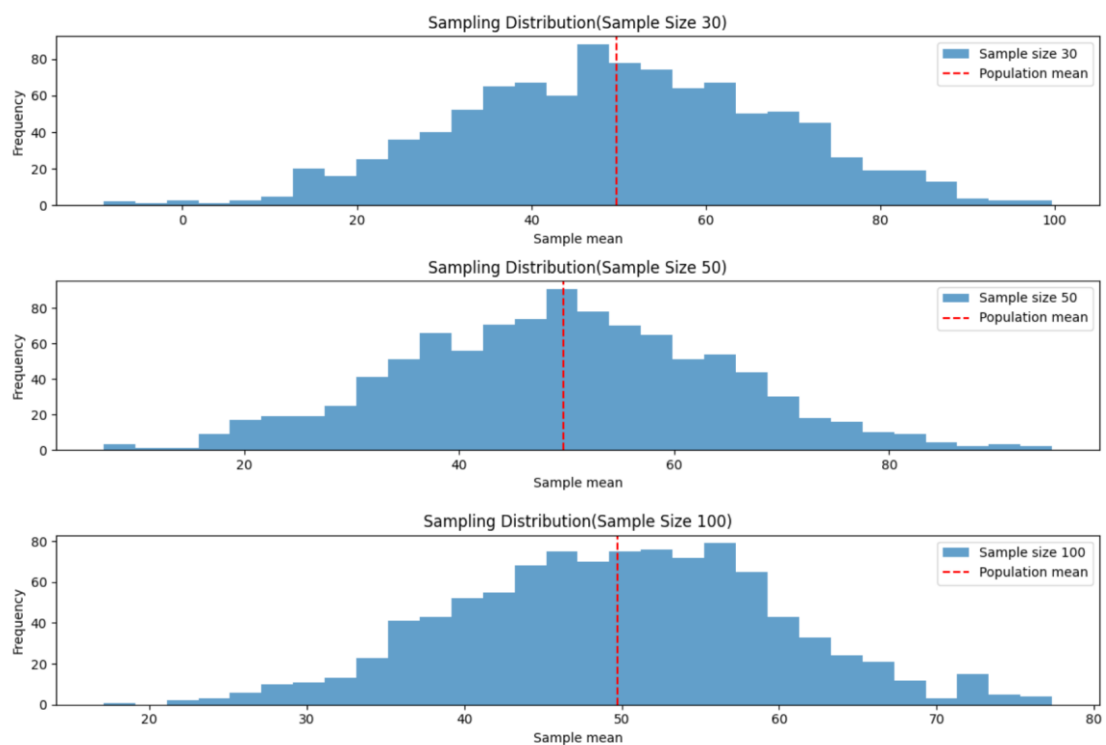
Program:

```python
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,i+1)
  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