Central Limit Theorem

Sample means drawn from a population will approximate a normal distribution (given enough draws / samples) and will approximate the mean of the population, regardless of the true distribution of the population.[1]

For this demonstration we use the exponential distribution, but as mentioned any distribution with a finite variance works.

```
import numpy as np
import seaborn as sns

population = np.random.exponential(np.random.uniform(0.1, 100), 10000)

N_draws = 1000

N_samples = 50

means_of_draws = np.zeros(N_draws)

for iDraw in range(N_draws):
    means_of_draws[iDraw] = np.mean(np.random.choice(population, N_samples,
replace=True))
```

```
sns.displot(means_of_draws)
```

[1] *Population dsitribution must have finite variance*

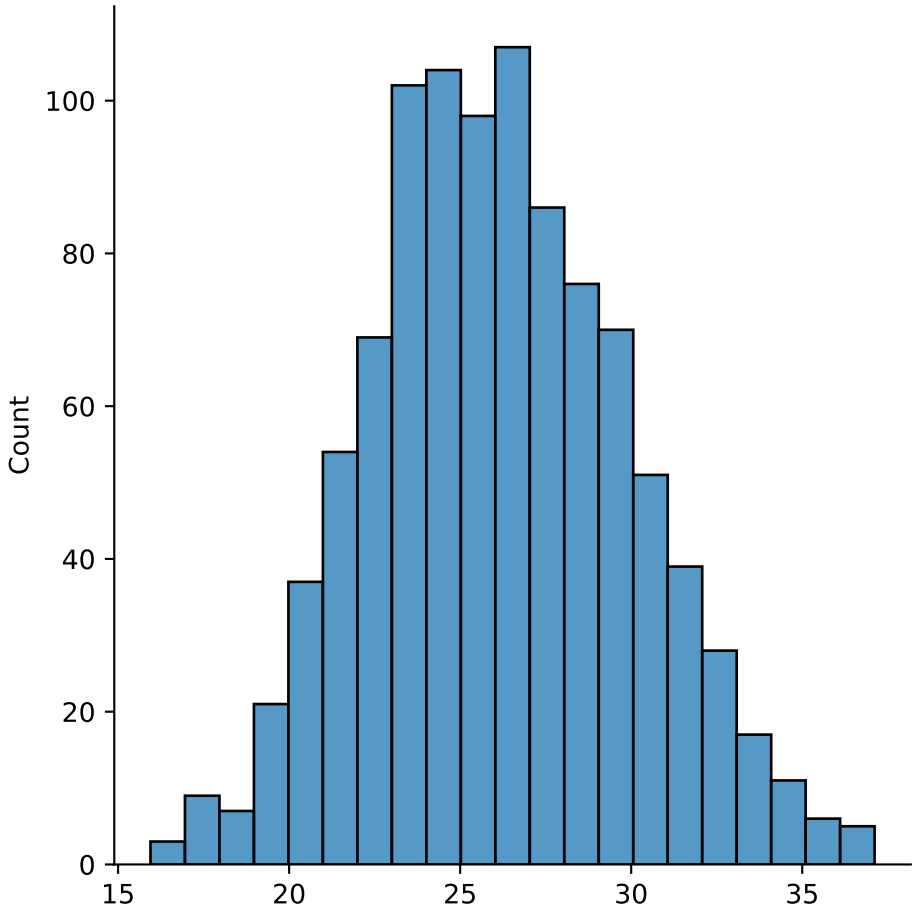

Figure 1: Distribution of sample means

```
population_mean = np.mean(population)
samples_mean = np.mean(means_of_draws)

print("True mean: ", round(population_mean, 2), "\nApprox mean: ",
round(samples_mean, 2))
```

```
True mean:  26.06
Approx mean:  26.18
```