Program 10 : Program to demonstrate sampling distribution using python

In [2]:

**import** numpy **as** np

**import** matplotlib.pyplot **as** plt

*# Population parameters*

population\_mean **=** 200

population\_std **=** 20

population\_size **=** 20000

*# Generate the population data*

population\_data **=** np**.**random**.**normal(population\_mean, population\_std, population\_size)

*# Function to calculate sample mean*

**def** calculate\_sample\_mean(sample\_size): sample\_means **=** []

num\_samples **=** 1000 *# Number of samples to draw*

**for** \_ **in** range(num\_samples):

sample **=** np**.**random**.**choice(population\_data, size**=**sample\_size, replace**=False**) sample\_means**.**append(np**.**mean(sample))

**return** sample\_means

*# Sample sizes to consider*

sample\_sizes **=** [10, 30, 50, 100]

*# Plot sampling distributions*

plt**.**figure(figsize**=**(12, 8))

**for** i, sample\_size **in** enumerate(sample\_sizes): plt**.**subplot(2, 2, i**+**1)

sample\_means **=** calculate\_sample\_mean(sample\_size)

plt**.**hist(sample\_means, bins**=**30, alpha**=**0.7, edgecolor**=**'black') plt**.**title(f'Sample Size: {sample\_size}')

plt**.**xlabel('Sample Mean') plt**.**ylabel('Frequency')

plt**.**tight\_layout() plt**.**show()

