Imports

In [1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

from scipy.stats import norm
```

CLT

Population

In [3]:
```
df = pd.read_csv("weight-height.csv")
df
```

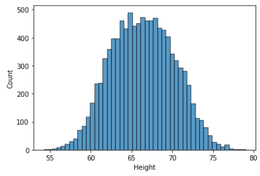
Out[3]:

	Gender	Height	Weight
0	Male	73.847017	241.893563
1	Male	68.781904	162.310473
2	Male	74.110105	212.740856
3	Male	71.730978	220.042470
4	Male	69.881796	206.349801
...	...	...	...
9995	Female	66.172652	136.777454
9996	Female	67.067155	170.867906
9997	Female	63.867992	128.475319
9998	Female	69.034243	163.852461
9999	Female	61.944246	113.649103

10000 rows × 3 columns

In [4]:
```
sns.histplot(df["Height"])
```

Out[4]:
```
<AxesSubplot:xlabel='Height', ylabel='Count'>
```



In [6]:
```
sigma=df["Height"].std()
sigma
```

Out[6]:
```
3.8475281207732324
```

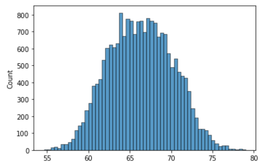
In [7]:
```
mu=df["Height"].mean()
mu
```

Out[7]:
```
66.36755975482106
```

Sample of 1

In [77]:
```
sample_1=[np.mean(df["Height"].sample(1)) for i in range(20000)]
```

In [78]:
```
sns.histplot(sample_1)
plt.show()
```



In [ ]:
```

```

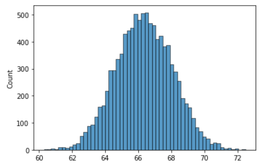
In [ ]:
```

```

Sample of 5

In [59]:
```
sample_5=[np.mean(df["Height"].sample(5)) for i in range(10000)]
```

In [60]:
```
sns.histplot(sample_5)
plt.show()
```



In [71]:
```
np.mean(sample_5)
```

Out[71]:
```
66.34934217426343
```

In [72]:
```
np.std(sample_5)
```

Out[72]:
```
1.70957842769632
```

In [86]:
```
sigma/np.sqrt(5)
```

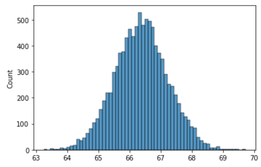
Out[86]:
```
1.7206668846781936
```

Sample of 20

In [67]:
```
sample_20=[np.mean(df["Height"].sample(20)) for i in range(10000)]
```

In [70]:
```
# sample_20
```

In [68]:
```
sns.histplot(sample_20)
plt.show()
```



In [73]:
```
np.mean(sample_20)
```

Out[73]:
```
66.38425328086795
```

In [74]:
```
np.std(sample_20)
```

Out[74]:
```
0.8492114545893626
```

In [87]:
```
sigma/np.sqrt(20)
```

Out[87]:
```
0.8603334423390968
```

Q1. Blood Pressure Problem Statement

Systolic blood pressure of a group of people is known to have an average of 122 mmHg and a standard deviation of 10 mmHg

Calculate the probability that the average blood pressure of 16 people will be greater than 125 mmHg.

In [80]:
```
1-norm.cdf(1.2)
```

Out[80]:
```
0.11506967022170822
```

In [81]:
```
1-norm.cdf(x=125,loc=122,scale=2.5)
```

Out[81]:
```
0.11506967022170822
```

Q2. Weekly Tooth Paste Sales Problem Statement

Weekly toothpaste sales have a mean 1000 and std dev 200. What is the probability that the average weekly sales next month is more than 1110?

In [82]:
```
1-norm.cdf(110/100)
```

Out[82]:
```
0.13566606094638267
```

In [83]:
```
1-norm.cdf(x=1110,loc=1000,scale=100)
```

Out[83]:
```
0.13566606094638267
```

Q3. Ecommerce Problem Statement

In an e-commerce website, the average purchase amount per customer is $80 with a standard deviation of $15. If we randomly select a sample of 50 customers, what is the probability that the average purchase amount in the sample will be less than $75?

In [84]:
```
norm.cdf((75-80)/(15/np.sqrt(50)))
```

Out[84]:
```
0.009211062727049501
```

In [85]:
```
norm.cdf(x=75,loc=80,scale=(15/np.sqrt(50)))
```

Out[85]:
```
0.009211062727049501
```

In [ ]: