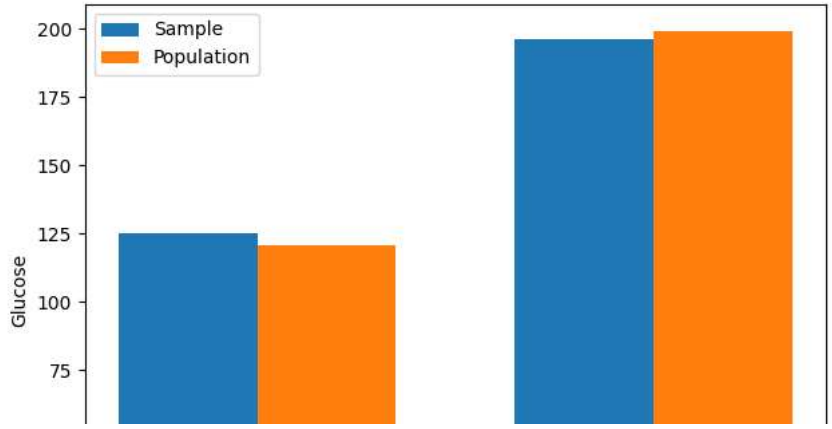
```
from google.colab import files
import pandas as pd

# Upload the CSV file
uploaded = files.upload()
```

```
Choose Files diabetes.csv
• diabetes.csv(text/csv) - 23873 bytes, last modified: 4/9/2023 - 100% done
Saving diabetes.csv to diabetes (1).csv
```

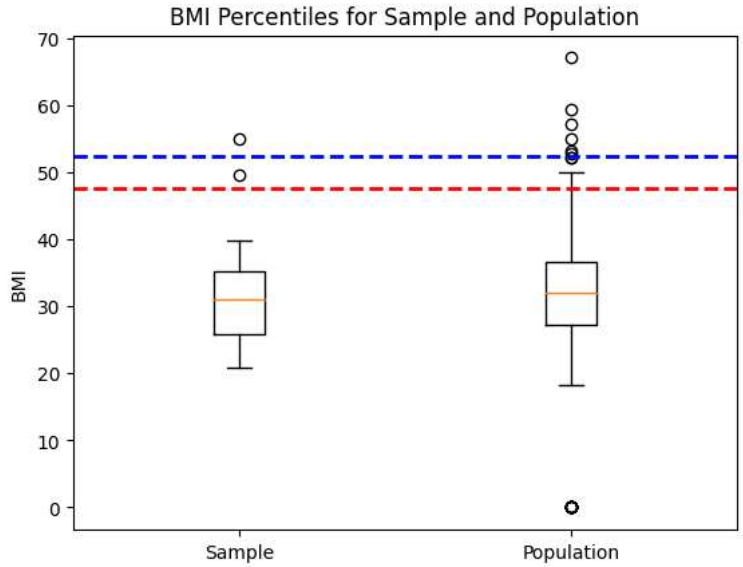
```
import numpy as np
import pandas as pd
import random
import matplotlib.pyplot as plt


diabetes = pd.read_csv('diabetes.csv')


diabetes.head()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

```
# Set random seed
np.random.seed(99)

# Generate a random sample of 25 observations
sample = diabetes.sample(n=25)

# Calculate mean and max of sample
mean_sample = np.mean(sample['Glucose'])
max_sample = np.max(sample['Glucose'])

# Calculate mean and max of population
mean_pop = diabetes['Glucose'].mean()
max_pop = diabetes['Glucose'].max()

# Create a bar chart to compare mean and max values
labels = ['Mean Glucose', 'Max Glucose']
sample_values = [mean_sample, max_sample]
pop_values = [mean_pop, max_pop]

x = np.arange(len(labels))
width = 0.35

fig, ax = plt.subplots()
rects1 = ax.bar(x - width/2, sample_values, width, label='Sample')
rects2 = ax.bar(x + width/2, pop_values, width, label='Population')

ax.set_ylabel('Glucose')
ax.set_xticks(x)
ax.set_xticklabels(labels)
ax.legend()

fig.tight_layout()

plt.show()
```

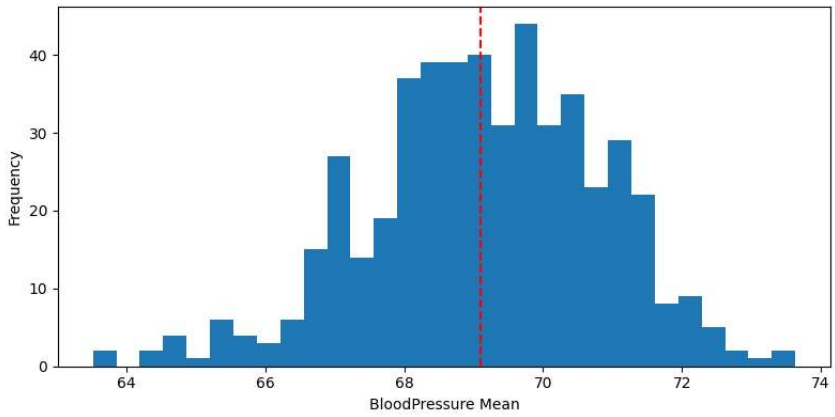


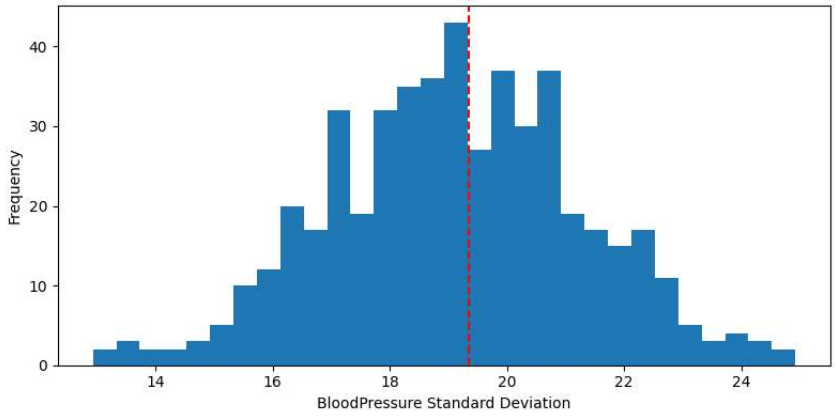

```
# Find the 98th percentile of BMI for the sample
sample_98th = np.percentile(sample['BMI'], 98)

# Find the 98th percentile of BMI for the population
pop_98th = np.percentile(diabetes['BMI'], 98)

# Create a box plot of BMI for the sample and population
plt.boxplot([sample['BMI'], diabetes['BMI']], labels=['Sample', 'Population'])
plt.title("BMI Percentiles for Sample and Population")
plt.ylabel("BMI")
plt.axhline(sample_98th, color='blue', linewidth=2, linestyle='--')
plt.axhline(pop_98th, color='red', linewidth=2, linestyle='--')
plt.show()
```




```
# Set random seed
np.random.seed(123)

# Define function to calculate mean, standard deviation, and percentile of BloodPressure
def calc_stats(data):
    return np.mean(data), np.std(data), np.percentile(data, 98)

# Generate 500 bootstrap samples of 150 observations each
n_samples = 500
sample_size = 150
bootstrap_means = []
bootstrap_stds = []
bootstrap_percentiles = []
for i in range(n_samples):
    sample = np.random.choice(diabetes['BloodPressure'], size=sample_size, replace=True)
    mean, std, percentile = calc_stats(sample)
    bootstrap_means.append(mean)
    bootstrap_stds.append(std)
    bootstrap_percentiles.append(percentile)
```

```
# Calculate population statistics for BloodPressure
pop_mean = np.mean(diabetes['BloodPressure'])
pop_std = np.std(diabetes['BloodPressure'])
pop_percentile = np.percentile(diabetes['BloodPressure'], 98)

# Create histograms to compare bootstrap means, standard deviations, and percentiles to population statistics
fig, axs = plt.subplots(3, 1, figsize=(8, 12))

axs[0].hist(bootstrap_means, bins=30)
axs[0].axvline(pop_mean, color='r', linestyle='--')
axs[0].set_xlabel('BloodPressure Mean')
axs[0].set_ylabel('Frequency')

axs[1].hist(bootstrap_stds, bins=30)
axs[1].axvline(pop_std, color='r', linestyle='--')
axs[1].set_xlabel('BloodPressure Standard Deviation')
axs[1].set_ylabel('Frequency')

axs[2].hist(bootstrap_percentiles, bins=30)
axs[2].axvline(pop_percentile, color='r', linestyle='--')
axs[2].set_xlabel('BloodPressure 98th Percentile')
axs[2].set_ylabel('Frequency')

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





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