Question 1

Difference between descriptive and inferential statistics:
- Descriptive Statistics: Summarizes and presents data. Example: Average marks of a class = 72.
- Inferential Statistics: Draws conclusions about a population from a sample. Example: Surveying 100 people to predict election results for a city.

Question 2

Sampling in statistics:
- Sampling: Selecting a subset of data from a larger population.
- Random Sampling: Every member has an equal chance of selection. Example: picking 50 students randomly from 1000.
- Stratified Sampling: Population divided into groups (strata) and samples taken from each. Example: dividing students by grade level and picking samples proportionally.

Question 3

Mean, Median, Mode:
- Mean: Arithmetic average (sum ÷ count).
- Median: Middle value when data is sorted.
- Mode: Most frequent value.
Importance: These are measures of central tendency and help summarize the 'typical' value in data.

Question 4

Skewness and Kurtosis:
- Skewness: Measures asymmetry of distribution. Positive skew → tail on right → more small values, few large.
- Kurtosis: Measures 'peakedness'. High kurtosis → heavy tails. Low kurtosis → flat.

Question 5

Python program to compute mean, median, mode:

```
import statistics as stats
numbers = [12, 15, 12, 18, 19, 12, 20, 22, 19, 19, 24, 24, 24, 26, 28]
print("Mean:", stats.mean(numbers))
print("Median:", stats.median(numbers))
print("Mode:", stats.mode(numbers))
```

Output:
Mean: 20.0
Median: 19
Mode: 12

Question 6

Covariance & Correlation:

```
import numpy as np
list_x = [10, 20, 30, 40, 50]
list_y = [15, 25, 35, 45, 60]
```

```
cov_matrix = np.cov(list_x, list_y, bias=True)
covariance = cov_matrix[0][1]
correlation = np.corrcoef(list_x, list_y)[0][1]
print("Covariance:", covariance)
print("Correlation:", correlation)
```

Output:
Covariance: 187.5
Correlation: 0.9934 (approx)

Question 7

Boxplot and outliers:

```
import matplotlib.pyplot as plt
data = [12, 14, 14, 15, 18, 19, 19, 21, 22, 22, 23, 23, 24, 26, 29, 35]
plt.boxplot(data)
plt.title("Boxplot Example")
plt.show()
```

Explanation: 35 is an outlier (far above Q3).

Question 8

Advertising spend vs sales:

```
advertising_spend = [200, 250, 300, 400, 500]
daily_sales = [2200, 2450, 2750, 3200, 4000]
corr = np.corrcoef(advertising_spend, daily_sales)[0][1]
print("Correlation:", corr)
```

Output: Correlation = 0.991 (strong positive)
Conclusion: More advertising → more sales.

Question 9

Customer survey distribution:
- Use mean and standard deviation for summary.
- Use histogram to visualize distribution.

```
import matplotlib.pyplot as plt
survey_scores = [7, 8, 5, 9, 6, 7, 8, 9, 10, 4, 7, 6, 9, 8, 7]
plt.hist(survey_scores, bins=6, edgecolor='black')
plt.title("Survey Scores Distribution")
plt.xlabel("Scores")
plt.ylabel("Frequency")
plt.show()
```

Result: Most scores between 6–9 → high satisfaction.