**Interquartile Range (IQR) and Outliers**

**Sum:**

a. The Interquartile Range. Compare the two Interquartile Ranges.

b. Any outliers in either set.

The five-number summary for the day and night classes is:

| | Minimum | Q1 | Median | Q3 | Maximum |
|---|---|---|---|---|---|
| Day | 32 | 56 | 74.5 | 82.5 | 99 |
| Night | 25.5 | 78 | 81 | 89 | 98 |

**Answer:**

a. Interquartile Range

The interquartile range (IQR) is a measure of variability in a dataset. It represents the range of the middle 50% of the data, after ordering from least to greatest.

Here's how to calculate the IQR for the day and night classes:

1. Day Class:

   Q1 (1st quartile) = 56

   Q3 (3rd quartile) = 82.5

   IQR_day = Q3 - Q1 = 82.5 - 56 = 26.5

2. Night Class:

Q1 (1st quartile) = 78

Q3 (3rd quartile) = 89

IQR_night = Q3 - Q1 = 89 - 78 = 11

Comparison:

The interquartile range for the day class (26.5) is larger than the night class (11). This indicates that the scores in the day class are more spread out than those in the night class. In other words, there is greater variability in the performance of students in the day class compared to the night class.

b. Outliers

Outliers are data points that fall outside the expected range based on the IQR. We can identify outliers using the following formula:

Upper limit = Q3 + 1.5 * IQR

Lower limit = Q1 - 1.5 * IQR

1. Day Class:

Upper limit = 82.5 + (1.5 * 26.5) = 115.75

Lower limit = 56 - (1.5 * 26.5) = -6.25

Since none of the scores in the day class (32, 56, 74.5, 82.5, 99) fall outside the upper and lower limits, there are **no outliers** in the day class data set.

2. Night Class:

Upper limit = 89 + (1.5 * 11) = 101.5

Lower limit = 78 - (1.5 * 11) = 64.5

The minimum score in the night class (25.5) falls below the lower limit (64.5). Therefore, there is **one outlier** in the night class data set (25.5).

**Summary**

The IQR for the day class (26.5) is larger than the night class (11), indicating greater spread in scores for the day class.

There are no outliers in the day class data set.

The night class has one outlier (25.5).