Interquartile Range (IQR) and Outlier Analysis – Day vs Night Classes

In this report, I calculated the Interquartile Range (IQR) for both the Day and Night classes, and then used the 1.5 × IQR rule to check for any outliers in the datasets.

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

Step 1: Calculate IQR

IQR is the difference between Q3 and Q1:

- **Day Class**:
  IQR = 82.5 − 56 = **26.5**
- **Night Class**:
  IQR = 89 − 78 = **11**

Step 2: Multiply IQR by 1.5

This helps us set boundaries to identify outliers:

- **Day Class**:
  1.5 × IQR = 1.5 × 26.5 = **39.75**
- **Night Class**:
  1.5 × IQR = 1.5 × 11 = **16.5**

Step 3: Calculate Outlier Boundaries

Using the formulas:
Lower Bound = Q1 − 1.5 × IQR
Upper Bound = Q3 + 1.5 × IQR

- **Day Class**:
  Lower Bound = 56 − 39.75 = **16.25**
  Upper Bound = 82.5 + 39.75 = **122.25**
- **Night Class**:
  Lower Bound = 78 − 16.5 = **61.5**
  Upper Bound = 89 + 16.5 = **105.5**

Step 4: Identify Outliers

Now I compared the actual min and max values with the bounds:

- **Day Class**:
  - Min = 32 → above 16.25
  - Max = 99 → below 122.25
    No outliers in the Day class.

- **Night Class**:
    - Min = 25.5 → below 61.5 → Outlier
    - Max = 98 → within upper bound
      One low outlier in the Night class: 25.5

Final Summary:

Class	IQR	Lower Bound	Upper Bound	Outliers
Day	26.5	16.25	122.25	None
Night	11	61.5	105.5	25.5 (low)

Conclusion:

- The Day class has a larger IQR (26.5), which means the scores are more spread out in the middle 50%.
- The Night class has a smaller IQR (11), so the scores are more closely packed.
- Only the **Night class had an outlier**, which was **25.5**, falling below the lower limit of 61.5.

This analysis helped me understand how IQR can be used to detect outliers and compare variability between two datasets.