## **Inter Quantile Range Exercise**

**Problem Statement:** Compare Day and Night class scores using the five-number summary to:

1. Calculate and compare IQRs.
2. Identify outliers using the 1.5 × IQR rule.

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

### **1. Interquartile Range (IQR)**

**Formula:**

**IQR=Q3−Q1**

* **Day class**: 82.5−56=26.582.5 - 56 = 26.582.5−56=26.5
* **Night class**:89−78=1189 - 78 = 1189−78=11

**IQR Results:**

* Day IQR = **26.5**
* Night IQR = **11**

### **2. Compare the Two IQRs**

* The Day class has a much wider spread in the middle 50% of its data than the Night class (26.5 vs. 11).
* This means the Day class scores are more variable, while the Night class scores are more consistent in their middle range.

### **3. Identify Outliers**

We use the 1.5 × IQR rule:

* Lower bound = Q1−1.5× IQR
* Upper bound = Q3+1.5×IQR

**Day class:**

* Lower bound = 56−1.5(26.5)=56−39.75=16.2556 - 1.5(26.5) = 56 - 39.75 = 16.2556−1.5(26.5)=56−39.75=16.25
* Upper bound = 82.5+39.75=122.2582.5 + 39.75 = 122.2582.5+39.75=122.25
* Data range: Min = 32, Max = 99 → No values below 16.25 or above 122.25 → No outliers.

**Night class:**

* Lower bound = 78−1.5(11)=78−16.5=61.578 - 1.5(11) = 78 - 16.5 = 61.578−1.5(11)=78−16.5=61.5
* Upper bound = 89+16.5=105.589 + 16.5 = 105.589+16.5=105.5
* Data range: Min = 25.5, Max = 98 → 25.5 < 61.5 → 25.5 is an outlier.

### **4. Final Answer**

* **IQR (Day)** = 26.5
* **IQR (Night)** = 11
* **Comparison**: Day has a wider spread of middle data values.
* **Outliers**:  
  + Day: None
  + Night: 25.5 is an outlier