1. Vandalism seems to be concentrated and clustered in the **northeastern** and **eastern** block groups, with some but few block groups with high vandalism in the west.

Chart

Description automatically generated

Range: **119**

Mean: **5.9240**

Median: **4**

Standard Deviation: **8.2651**

Interquartile Range: **5**

Upper whisker based on a 1.5 hinge: 1.5 + 1.5 \* 5 = **15**

Upper whisker based on a 3.0 hinge: 3.0 + 1.5 \* 5 = **22.5**

1. There are 23 rows selected, corresponding to 23 block groups. These **23 outliers** are primarily in the northeast, suggesting that vandalism is significantly higher in that area.

A picture containing text

Description automatically generated

The area with POLY\_ID=15 has **4** neighbors: **181**, **183**, **185**, **186.**

The area with POLY\_ID=304 has **0** neighbors.

Chart, line chart

Description automatically generated

Moran’s I Value: **0.452**

This value suggests that vandalism values are somewhat clustered (about halfway between fully clustered and perfectly random).

1. The pseudo p-value associated with this Moran’s I value with 999 permutations is **0.001**, which is less than the significance level 0.05 and therefore statistically significant, meaning that we **can reject the null hypothesis** that vandalism is randomly distributed across the study region.

A close up of a piece of paper

Description automatically generated

As shown above, **hotspots occur in the northeast and coldspots in the southwest**. Using the p=0.001 significance level, **8 block groups are identified as hotspots**, and **10 as coldspots**.

Part 2

5.

Chart, line chart, scatter chart

Description automatically generated

Moran’s I: **0.49**

This value suggests that robbery values are somewhat clustered (about halfway between fully clustered and perfectly random). This value indicates that robberies are slightly more clustered than vandalism.

6. The pseudo p-value associated with this Moran’s I value with 999 permutations is **0.001**, which is less than the significance level 0.05 and therefore statistically significant, meaning that we **can reject the null hypothesis** that robbery is randomly distributed across the study region.

7.A picture containing text

Description automatically generated

**Hotspots occur in the northeast** (shown above in dark red), and **coldspots occur in the west and northwest** (dark blue). Using the p=0.001 significance level, **18 block groups are identified as hotspots**, and **7 as coldspots**.

9. When ‘neighbors’ were defined by a queen-based first order contiguity for vandalism, there was a Global Moran’s I value of 0.452, and 8 hotspots and 10 coldspots under the significance value of p=0.001 (according to the Local Moran’s I).

With a rook-based contiguity there is a Moran’s I of 0.453, indicating slightly more clustering. There are also 7 hotspots and 3 coldspots, indicating fewer areas where high values were clustered together, and low values were clustered together.

With a queen-based contiguity of order 3, the Moran’s I was 0.233, much more random than that of the first order-based neighbors. There were 49 hotspots and 80 coldspots. Increasing the order of contiguity therefore leads to an increase in the number of hotspots and coldspots while producing a Moran’s I indicating more randomness.

Using K-nearest Neighbors with neighbors=4 produces a Moran’s I of 0.401, which is lower and more random. Univariate Local Moran’s I produced 4 hotspots and 3 coldspots with p=0.001.