

Homework:
Boxplots

MATH 150

Due: Feb 5, 2024

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Problem 1

The following table shows 20 observations of gas mileages of 20 cars from model year 1974.

10.4 13.3 15.0 15.2 15.2 15.8 16.4 18.1 18.7 19.2 19.2 21.0 21.0 21.4 22.8 22.8 27.3 30.4 32.4 33.9

- (a) Compute the five-number summary and IQR.
- (b) Should any of these observations be considered outliers? Apply the standard from class.
- (c) Sketch a boxplot for this data.

Answer

(a)

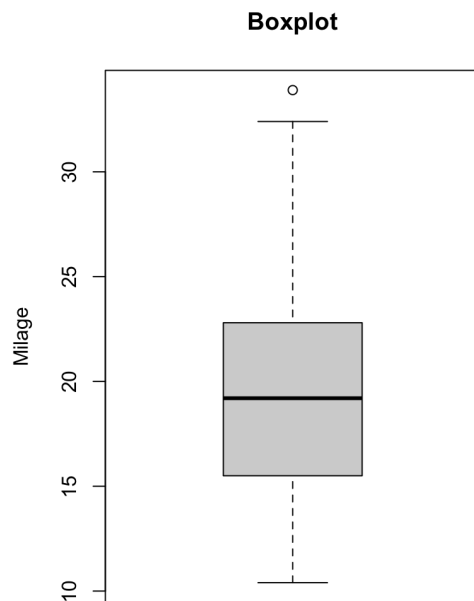
five-number summary: $\min = 10.4$; $Q1 = 15.0$; $Median = 18.7$; $Q3 = 21.4$; $\max = 33.9$
IQR: $21.4 - 15.0 = 6.4$

(b)

Lower bound: $Q1 - 1.5 \times IQR = 15.0 - 1.5 \times 6.4 = 15.0 - 9.6 = 5.4$
Upper bound: $Q3 + 1.5 \times IQR = 21.4 + 1.5 \times 6.4 = 21.4 + 9.6 = 31.0$

Therefore 32.4 and 33.9 are potential outliers.

(c)



Problem 2

Refer to the rock sample data set, available on Moodle.

- Compute the five-number summary and IQR for the area variable. The sort command may be helpful. Do NOT use more advanced tools (even the median function).
- Should any of these observations be considered outliers? Apply the standard from class.
- Sketch a boxplot for this data.

Answer

(a) First we'll sort the area column with the `sort()` function. Then we calculate:
five-number summary: $\min = 1016$; $Q1 = 5318$; $Median = 7838$; $Q3 = 8868$; $\max = 12212$
IQR: $8868 - 5318 = 3550$

(b) First we calculate the lower and upper bounds using the IQR:
Lower bound: $Q1 - 1.5 \times IQR = 5318 - 1.5 \times 3550 = 5318 - 5325 = -7$
Upper bound: $Q3 + 1.5 \times IQR = 8868 + 1.5 \times 3550 = 8868 + 5325 = 9400$

Therefore 9718, 9867, 10651, 10743, 10962, 11876, 11878 and 12212 are potential outliers.

(c)

