Chapter 5: Exploring Data: Distributions

Section 5.6 The Five-Number Summary and Boxplots

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The Five-Number Summary

The **five-number summary** of a distribution consists of the smallest observation, the first quartile, the median, the third quartile, and the largest observation, written in order from smallest to largest.

In symbols, the five -number summary is

Minimum Q_1 M Q_3 Maximum

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Example: Find the five-number Summary of the

Data: 7 4 10 8 5 6 4 6 1 3 7 5

Answer:

-Arrange all observation in the order of size:
1 3 4 4 5 5 6 6 7 7 8 10

n = 12 Median = (5 + 6)/ 2 = 11/2 = 5.5
The Median of 1 3 4 4 5 5 => (4+4)/2 = 4 => Q_1= 4
The Median of 6 6 7 7 8 10 => (7+7)/2 =7 => Q_3 = 7

1 4 5.5 7 10

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An Old Exam Question

Below are the lengths (in minutes) of phone calls made on an 800 line to a business on one day. Find the five-number Summary for this data.

14, 6, 12, 19, 2, 35, 5, 4, 3, 7, 5, 8

Answer:

2, 3, 4, 5, 5, 6, 7, 8, 12, 14, 19, 35

Median=(6+7)/2=6.5
Q1=(4+5)/2=4.5
Q3=(12+14)/2=13
Min = 2
Max = 35

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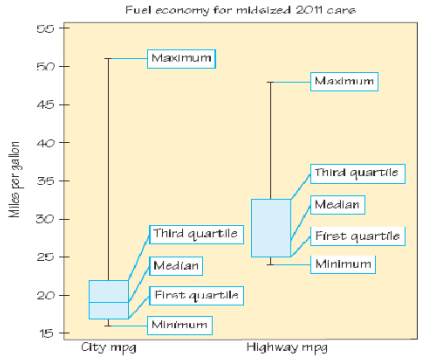
- Boxplots
  - A boxplot is a graph of the five-number summary.
  - Boxplots are often used for side-by-side comparison of one or more distributions (they show less detail than histograms or stemplots).
    - A box spans the quartiles, with an interior line marking the median.
    - Lines extend out from this box to the extreme high and low observations (maximum and minimum).
    - A box plot may be drawn vertically or horizontally.

Boxplots of the highway and city gas mileages for cars classified as midsized by the Environmental Protection Agency.



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