

Boxplots

Robb T.
Koether

Homework
Review

Boxplots

TI-83 Boxplots

Modified
Boxplots

TI-83 Modified
Boxplots

Assignment

Boxplots

Lecture 17

Section 5.3.3

Robb T. Koether

Hampden-Sydney College

Wed, Sep 24, 2008

Outline

Boxplots

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- 2 Boxplots
- 3 TI-83 Boxplots
- 4 Modified Boxplots
- 5 TI-83 Modified Boxplots
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Homework Review

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There was no homework.

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Assignment

Definition (Boxplot)

A **boxplot** is a graphical display of a five-number summary.

- The interquartile range is represented by a rectangle over a vertical scale.
- The median is represented by a vertical line through the rectangle.
- The maximum and minimum are represented by “tails” or “whiskers” attached to the ends of the rectangle.

Example

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Assignment

Example (Boxplot)

- Draw a boxplot of the sample

5, 20, 30, 45, 60, 80, 100, 140, 150, 200, 240.

Example

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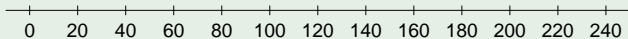
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Example (Boxplot)



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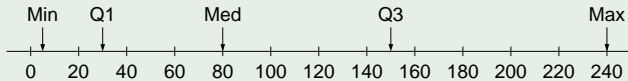
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Example (Boxplot)



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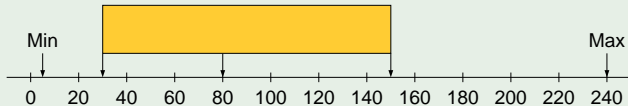
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Example (Boxplot)



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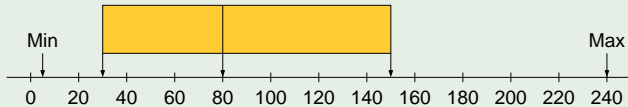
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Example (Boxplot)



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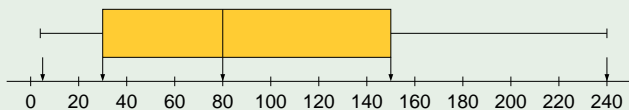
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Example (Boxplot)



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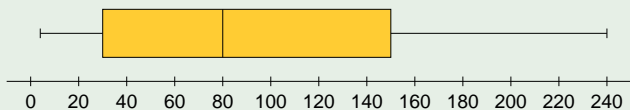
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Assignment

Example (Boxplot)



Boxplots and Shape

Boxplots

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Assignment

- What would a boxplot for a uniform distribution look like?
- What would a boxplot for a symmetric distribution look like?
- What would a boxplot for a right-skewed distribution look like?

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Assignment

TI-83 Boxplots

- To draw a boxplot on the TI-83,
 - Press `STAT PLOT`.
 - Select `Plot1`
 - Turn `Plot1` On.
 - Under `Type`, select the boxplot icon (2nd row, 2nd icon).
 - Specify list `L1`.
 - Press `ZOOM`.
 - Select `ZoomStat (#9)` and press `ENTER` (or press `9`).

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Assignment

TI-83 Boxplots

- To get the five-number summary from the boxplot,
 - Press `TRACE`.
 - Use the arrow keys to see the values of the minimum, Q_1 , the median, Q_3 , and the maximum.

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Example (TI-83 Boxplots)

- Use the TI-83 to draw a boxplot of the rainfall data.

2.82	24.18	0.20	15.60	22.04	7.44
5.16	9.14	37.36	10.19	2.16	17.50
28.12	11.23	8.66	7.24	6.50	4.88
13.08	4.01	11.28	1.96	12.09	2.92
7.67	4.39	6.60	6.50	25.43	0.74

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Assignment

Definition (Outlier)

An **outlier** is any value that is more than 1.5 IQR below Q_1 or more than 1.5 IQR above Q_3 .

Definition (Extreme outlier)

An **extreme outlier** is any value that is more than 3 IQR below Q_1 or more than 3 IQR above Q_3 .

Definition (Modified boxplot)

A **modified boxplot** is a boxplot in which the outliers (and extreme outliers) are indicated by separate dots.

Modified Boxplots

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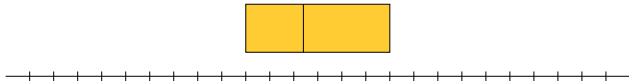
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Assignment

- To draw a modified boxplot,
 - Draw the box part of the boxplot as usual.
 - Compute $\text{STEP} = 1.5 \times \text{IQR}$.
 - The inner fences are at $Q_1 - \text{STEP}$ and $Q_3 + \text{STEP}$.



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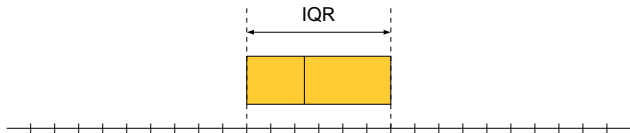
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Assignment

- To draw a modified boxplot,
 - Draw the box part of the boxplot as usual.
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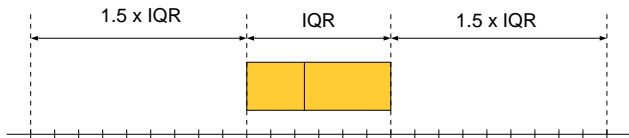
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Assignment

- To draw a modified boxplot,
 - Draw the box part of the boxplot as usual.
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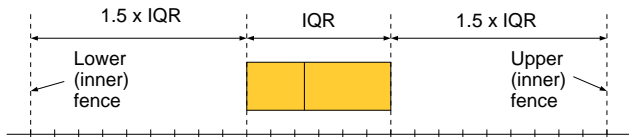
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Assignment

- To draw a modified boxplot,
 - Draw the box part of the boxplot as usual.
 - Compute $\text{STEP} = 1.5 \times \text{IQR}$.
 - The inner fences are at $Q_1 - \text{STEP}$ and $Q_3 + \text{STEP}$.



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Assignment

- Extend the whiskers from the box to the smallest and largest values that are within the inner fences.
- Any values that are outside the inner fences should be drawn as individual dots.
- These dots represent outliers.

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Assignment

Practice

- Draw a modified boxplot of the sample

9, 13, 38, 40, 42, 43, 46, 47, 49, 53, 55, 60, 84.

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Assignment

TI-83 Modified Boxplots

- Follow the same steps as for a regular boxplot, but for the `Type`, select the modified-boxplot icon, the first icon in the second row. It looks like a boxplot with a couple of extra dots.

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Example

TI-83 Modified Boxplots

- Use the TI-83 to draw a modified boxplot of the rainfall data.

2.82	24.18	0.20	15.60	22.04	7.44
5.16	9.14	37.36	10.19	2.16	17.50
28.12	11.23	8.66	7.24	6.50	4.88
13.08	4.01	11.28	1.96	12.09	2.92
7.67	4.39	6.60	6.50	25.43	0.74

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Assignment

Practice

- Use the TI-83 to draw a modified boxplot of the sample data.

9, 13, 38, 40, 42, 43, 46, 47, 49, 53, 55, 60, 84.

Box Plots

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Assignment

- For an example of modified boxplots, see [DePaul University's web page on retention.](#)

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- Read Section 5.3.3, pages 315 - 325.
- Let's Do It! 5.8, 5.9, 5.10, 5.11.
- Page 333, exercises 12, 13, 15, 19.