

Ch. 6: Comparing Two Means

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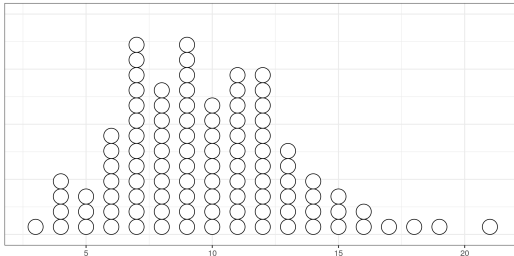
6.1: Comparing Two Groups

Quantitative Response

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Describing Distributions of Quantitative Data

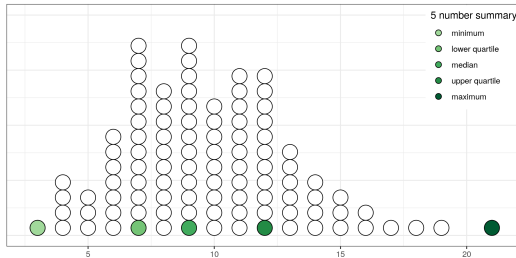
- **5-number summary** - the minimum, lower quartile, median, upper quartile, and maximum of a set of data
 - **lower quartile** - 25% of the data lie below this value
 - **median** - 50% of the data lie below this value
 - **upper quartile** - 75% of the data lie below this value



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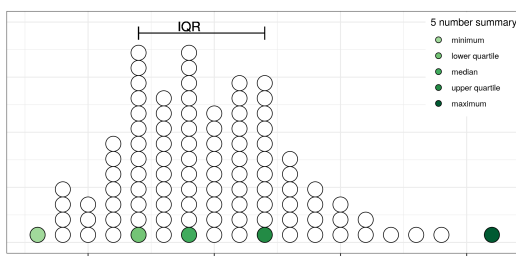
Describing Distributions of Quantitative Data

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Describing Distributions of Quantitative Data



The distance between the two quartiles is called the **inter-quartile range (IQR)**. The IQR is another measure of variability, along with the standard deviation.

The IQR is resistant (or *robust*) to extreme values and skewness, unlike the standard deviation.

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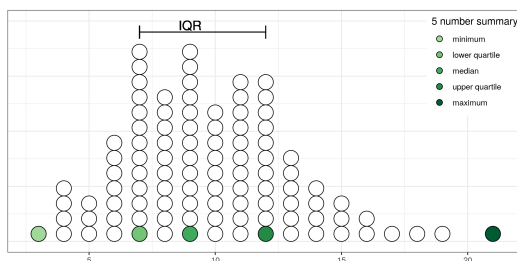
Describing Distributions of Quantitative Data

A **boxplot** (or box-and-whisker plot) is a visual display of the 5-number summary.

- The box displays the middle 50% of the distribution and its width (the IQR) shows the spread of the bulk of the distribution.
- The 'whiskers' extend to the
 - smallest and largest values in the dataset
 - OR the values in the dataset that are within $1.5 \times \text{IQR}$ away from the edges of the box.
 - Observations outside of the $1.5 \times \text{IQR}$ range may be shown as dots and are outliers

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Describing Distributions of Quantitative Data



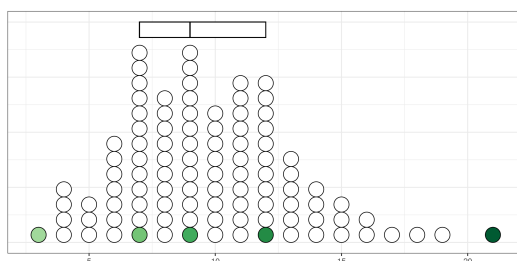
What are the following values?

- bottom whisker:
- lower quartile:
- median:
- upper quartile:
- top whisker:

Are there any outliers?

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Describing Distributions of Quantitative Data



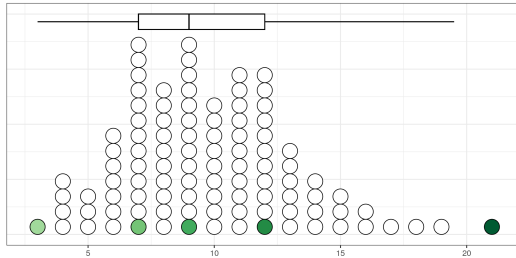
What are the following values?

- bottom whisker:
- lower quartile: 7
- median: 9
- upper quartile: 12
- top whisker:

Are there any outliers?

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Describing Distributions of Quantitative Data

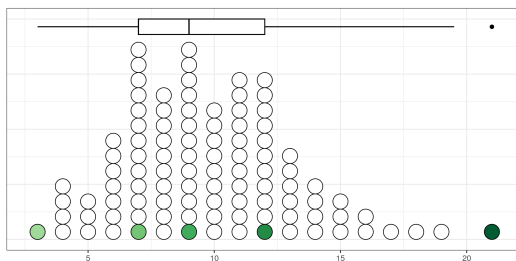


- bottom whisker: $1.5 \times \text{IQR}$ below lower quartile, or smallest observation
 $7 - 1.5(12-7) = -0.5$ or 3
 bottom whisker: 3
- top whisker: $1.5 \times \text{IQR}$ above upper quartile, or largest observation
 $12 + 1.5(12-7) = 19.5$ or 21
 top whisker: 19.5

Are there any outliers?

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Describing Distributions of Quantitative Data



What are the following values?

- bottom whisker: 3
- lower quartile: 7
- median: 9
- upper quartile: 12
- top whisker: 19.5

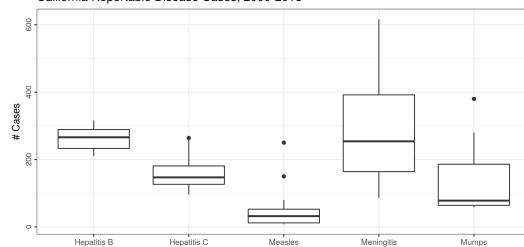
Are there any outliers? Yes, at 21

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Describing Distributions of Quantitative Data

Boxplots make it easy to compare distributions of different groups.

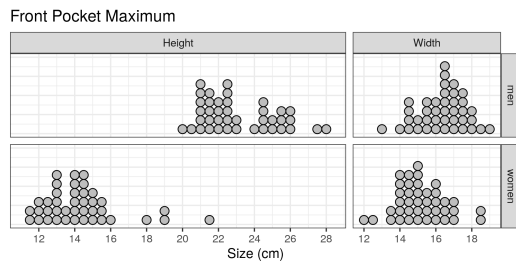
California Reportable Disease Cases, 2000-2018



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In-Class Practice: Jean Pocket Sizes

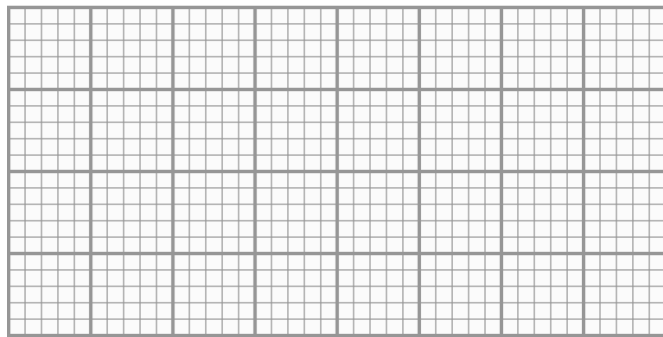
Using the graph paper on the next page, create boxplots for each of the dimensions in the chart below.



Data source: <https://pudding.cool/2018/08/pockets/>

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In-Class Practice: Jean Pocket Sizes



What do you conclude about the distributions of front pocket maximum dimensions when comparing Men's jeans to Women's jeans?

Upload your graph and conclusions to Canvas.

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