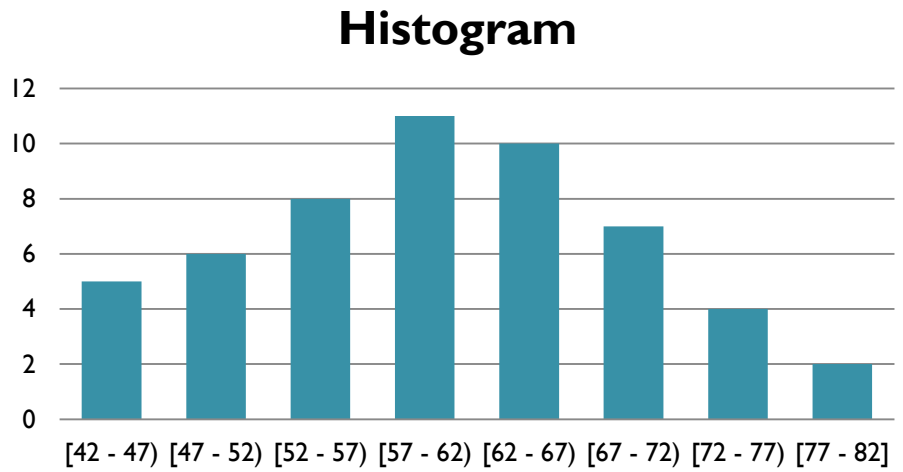
Descriptive Statistics

- Data Presentation
  - The common statistics included may also not be adequate to describe data
  - There are many more measures used
    - Measures of central tendency
      - Mean, trimmed mean, median, mode
    - Measures of dispersion
      - Standard deviation, variance, range, interquartile range, mean absolute deviation, coefficient of dispersion
    - Measures on individual data points
      - Standard deviation unit, standard score

Descriptive Statistics

- Data Organization
  - Histogram
    - Graph of interval vs frequency
    - Bar graph for grouped data
      - Original frequency distribution table
      - X-axis: cell boundaries
      - Y-axis: frequency

Frequency Distribution Table		
Cell Boundaries	f_i	x_i
[42 - 47)	5	44.5
[47 - 52)	6	49.5
[52 - 57)	8	54.5
[57 - 62)	11	59.5
[62 - 67)	10	64.5
[67 - 72)	7	69.5
[72 - 77)	4	74.5
[77 - 82]	2	79.5



Histogram done in Excel

Descriptive Statistics

- Data Organization
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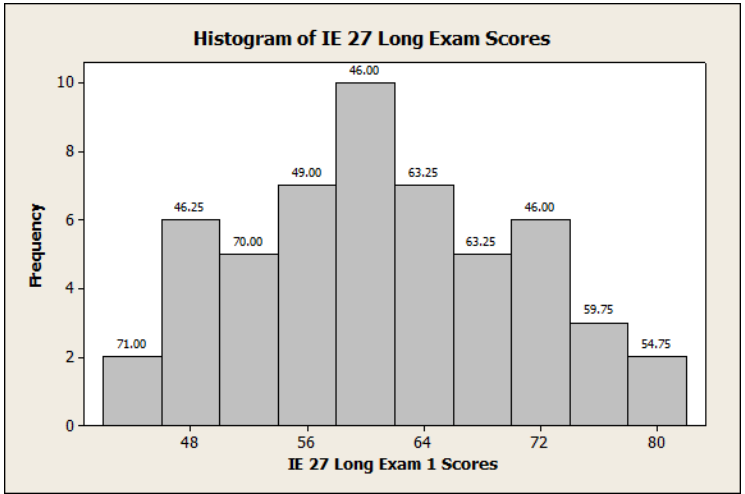


Histogram done in Minitab

Minitab used different cell boundaries: has 10 cells each with width of 4

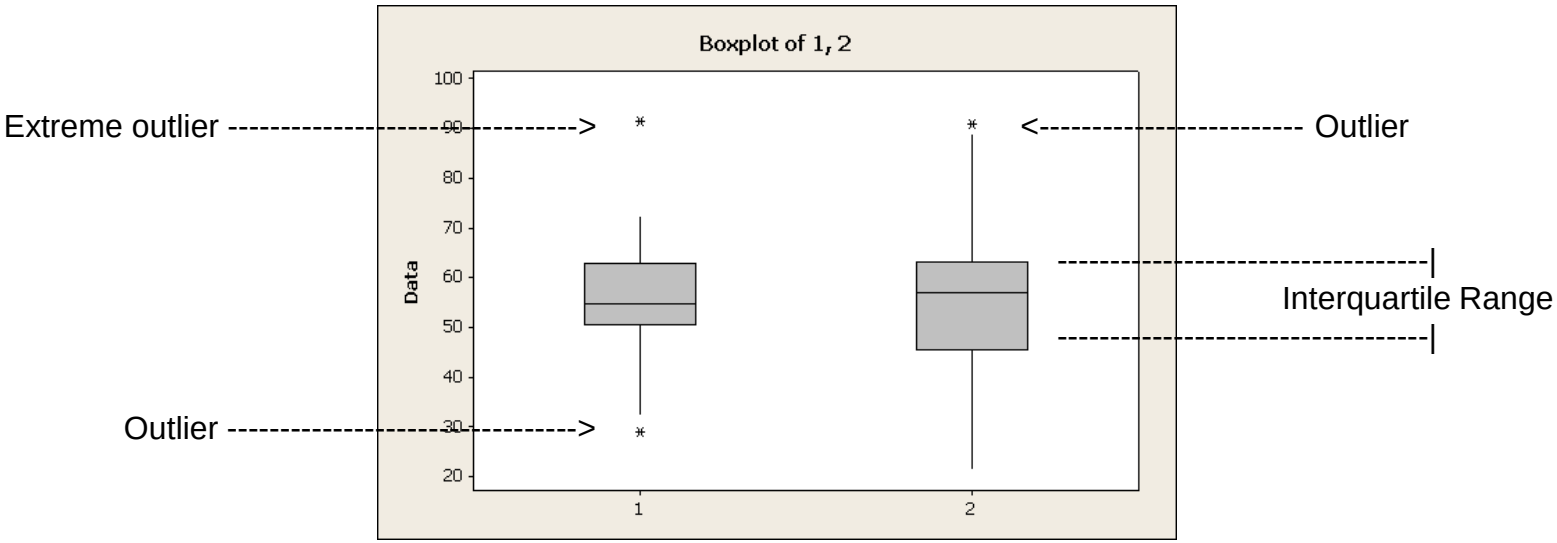
Lower bound: 42 (same)
Upper bound: 82 (same)

Outline of Discussion

- Lesson Proper
  - Descriptive Statistics
    - Data Organization
    - Data Analysis
    - Statistical Measures
- Case Study

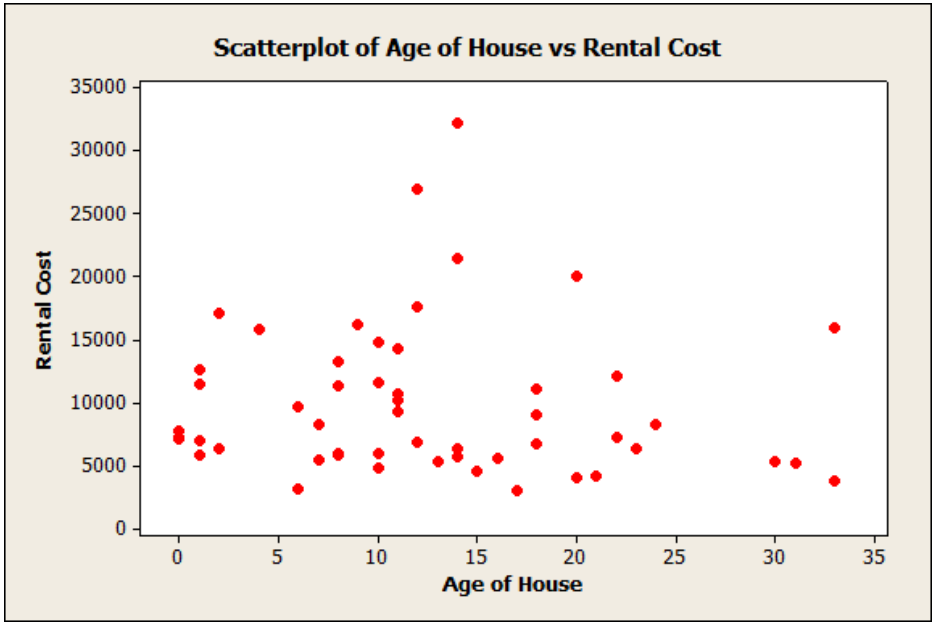
Descriptive Statistics

- Data Analysis
  - Boxplot
    - How to interpret a boxplot (box and whisker plot)
      - Some boxplots have outliers
      - Outliers are values which are beyond the whiskers but within three interquartile ranges from the box edge
      - Outliers farther than three interquartile ranges are called extreme outliers



Descriptive Statistics

- Data Analysis
  - Scatterplot
    - How to interpret a scatter plot
      - If the points form a diagonal line, variables are correlated
      - Perfect horizontal line means correlation is zero



Descriptive Statistics

- Statistical Measures
  - Measures of Central Tendency
    - Describes the tendency of sample data to cluster around a particular value
      - Mean
      - Median
      - Mode

Descriptive Statistics

- Statistical Measures
  - Measures of Variability/Dispersion
    - Example:
      - Determine the 64th percentile, range, and interquartile range of the following data set
      - Quiz Question

Number of hours of sleep per day				
9	7	8	6	11
6	5	6	9	4

      - *Hint: Arrange first in increasing order: 4, 5, 6, 6, 6, 7, 8, 9, 9, 11*
      - *Hint: X^{th} percentile = $X*(n+1)$, range = max – min, interquartile range = 75^{th} percentile – 25^{th} percentile*

Descriptive Statistics

- Statistical Measures
  - Measure of Linear Relationship
    - Correlation coefficient
      - Determines the linearity between variables of a population

$$\rho = \frac{\sigma_{xy}}{\sigma_x \sigma_y}$$

    - Pearson's r coefficient
      - Determines the linearity between variables of a sample

$$r = \frac{n\sum XY - \sum X \sum Y}{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}$$

      - Nonzero correlation coefficient means there is a linear relationship
      - Zero correlation coefficient means either they are independent of each other or their relationship is nonlinear
      - Excel scatterplot uses r^2 which is more accurate and reliable

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Summary

- Data Organization
  - Frequency Distribution Table
    - Histogram
    - Cumulative Frequency Distribution Table
    - Ogive
    - Pareto Chart