

Review for Exam #1

Chapter 1

Population

the complete collection of elements
(scores, people, measurements, etc.)
to be studied

Sample

a subcollection of elements drawn
from a population

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The Nature of Data

Definitions

Quantitative data

numbers representing counts or measurements

Qualitative (attribute) data

nonnumeric data that can be separated into different
categories (categorical data)

Definitions

Discrete - Countable

Continuous - Measurements with no gaps

Levels of Measurement

Nominal - names only

Ordinal - names with some order

Interval - differences but no 'zero'

Ratio - differences and a 'zero'

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Critical Thinking

- ❖ Voluntary Response Samples
- ❖ Small Samples
- ❖ Graphs
- ❖ Pictographs
- ❖ Percentages
- ❖ Loaded Questions
- ❖ Order of Questions
- ❖ Refusals
- ❖ Etc.

Methods of Sampling

- Random
- Systematic
- Convenience
- Stratified
- Cluster

Chapters 2,3

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Determine the Definition Values for this Frequency Table

Quiz Scores	Frequency
0-4	2
5-9	5
10-14	8
15-19	11
20-24	7

- ❖ Classes
- ❖ Lower Class Limits
- ❖ Upper Class Limits
- ❖ Class Boundaries
- ❖ Class Midpoints
- ❖ Class Width

Stem-Leaf Plots

10 11 15 23 27 28 38 38 39 39
40 41 44 45 46 46 52 57 58 65

Stem	Leaves
1	015
2	378
3	8899
4	014566
5	278
6	5

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Measures of Center

Mean

Median

Mode

Midrange

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Calculator Basics for Statistical Data

1. Put calculator into statistical mode
2. Clear previous data
3. Enter data (and frequency)
4. Select key(s) that calculate \bar{x}

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Mean for a Frequency Table

Quiz Scores	Midpoints	Frequency
0-4	2	2
5-9	7	5
10-14	12	8
15-19	17	11
20-24	22	7

$\bar{x} = 14.4$
(rounded to one more decimal place than data)

Measure of Variation

Range

$$\text{highest score} - \text{lowest score}$$

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Measure of Variation

Standard Deviation

a measure of variation of the scores
about the mean

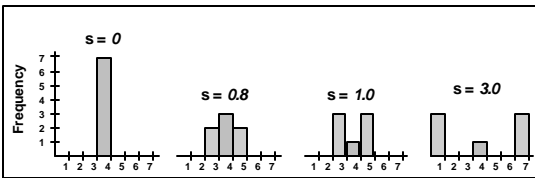
(average deviation from the mean)

Measure of Variation

Variance

standard deviation squared

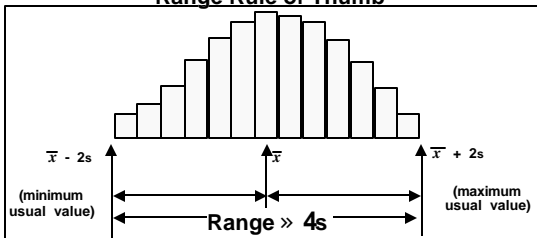
Same Means ($\bar{x} = 4$) Different Standard Deviations



Standard Deviation

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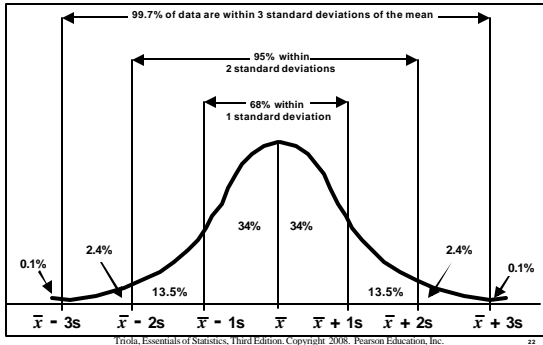
Estimation of Standard Deviation Range Rule of Thumb



$$s \gg \frac{\text{Range}}{4} = \frac{\text{highest value} - \text{lowest value}}{4}$$

The Empirical Rule (applies to bell-shaped distributions)

FIGURE 2-13



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Measures of Position z score

Sample

Population

$$z = \frac{x - \bar{x}}{s}$$

$$z = \frac{x - \mu}{S}$$

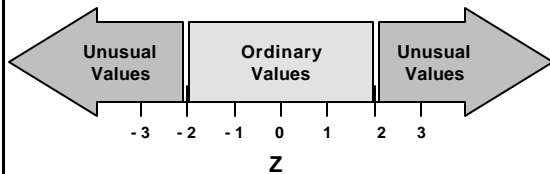
Round to 2 decimal places

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FIGURE 2-14

Interpreting Z Scores



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Other Measures of Position

Quartiles and Percentiles

Finding the Percentile of a Given Score

$$\text{Percentile of score } x = \frac{\text{number of scores less than } x}{\text{total number of scores}} \cdot 100$$

200 201 204 206 206 208 208 209 215 217 218

$$\text{percentile of } 204 = \frac{2}{11} \cdot 100 = 18$$

204 is the 18th percentile

99

Finding the Value of the kth Percentile

200 201 204 206 206 208 208 209 215 217 218
Find the 75th percentile.

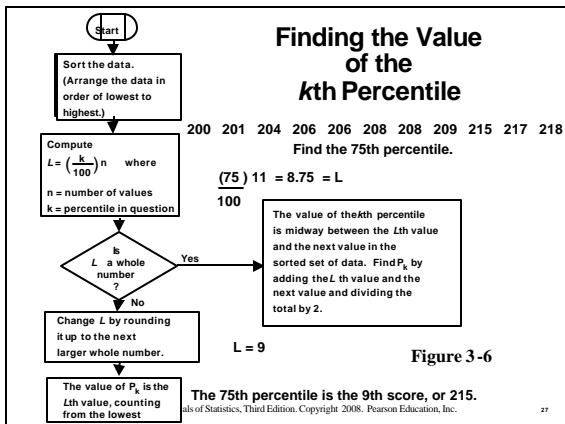
$$\frac{(75) 11}{100} = 8.75 = L$$

The value of the kth percentile is midway between the Lth value and the next value in the sorted set of data. Find P_k by adding the Lth value and the next value and dividing the total by 2.

$$L = 9$$

Figure 3-6

The 75th percentile is the 9th score, or 215.



Quartiles

$$Q_1 = P_{25}$$

$$Q_2 = P_{50}$$

$$Q_3 = P_{75}$$

Boxplot

pulse rates (beats per minute) of smokers

52 52 60 60 60 60 63 63 66 67 68
69 71 72 73 75 78 80 82 83 88 90

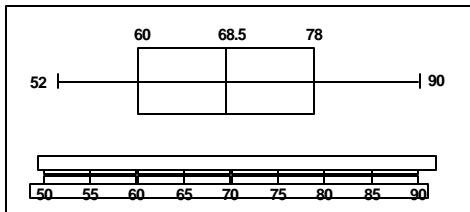
5 - number summary

- ❖ Minimum - 52
- ❖ first quartile Q1 - 60
- ❖ Median - 68.5
- ❖ third quartile Q3 - 78
- ❖ Maximum - 90

100

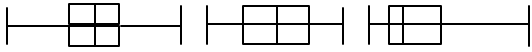
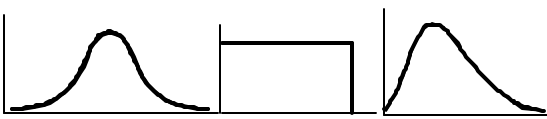
Boxplot

Box-and-Whisker Diagram



Boxplot of Pulse Rates (Beats per minute) of Smokers

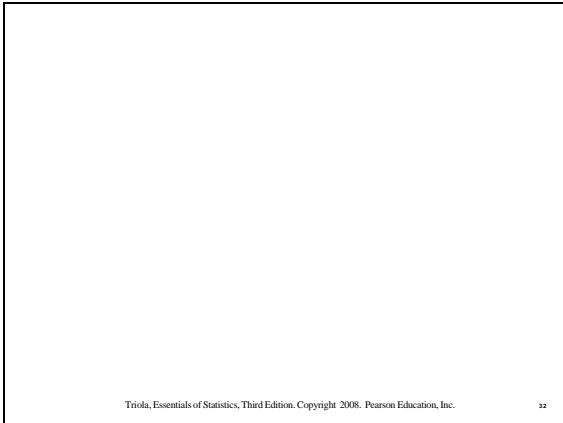
Boxplot



Bell-Shaped

Uniform

Skewed



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