3.1 Measures of Center

GOALS: Understand measures of Central Tendencies

- Mean
- Median
- Mode

Study Ch. 3.1, #3-7, 11-15, 19(15), 21(17), 29(25), 31, ~33, ~35

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes Homework

2.1 Variable & Data

3.1 Measures of Center

1. **Mean:** $\frac{\Sigma \text{ of observations}}{\text{No. of observations}}$

2. **Median:** value in the middle of ordered data

If number of observations is:

odd: median = middle term 1 2 **3** 4 5

even: median = mean of two middle terms 1 2 3 | 4 5 6 $\frac{3+4}{2} = \frac{7}{2} = 3.5$

3. **Mode:** value(s) that occur most often

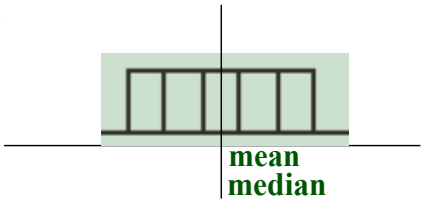
If no value occurs more than others, NO mode.

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

2.1 Variable & Data

3.1 Measures of Center



1 2 3 4 5

$\bar{x} = \frac{15}{5} = 3.0$ med = 3.0

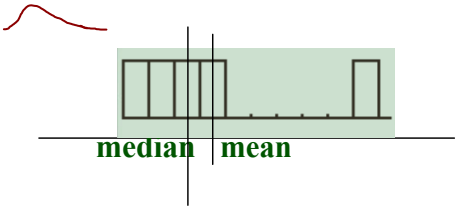
The data set is, by design, super simple to help us visualize how extreme values impact the distribution and symmetry.

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Quantitative Data

3.1 Measures of Center



1 2 3 4 10

$\bar{x} = \frac{20}{5} = 4.0$ med = 3.0

The mean has shifted towards the extreme value.

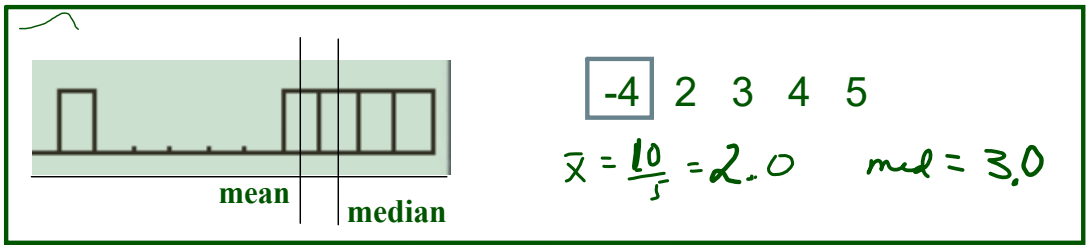
Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Quantitative Data

3.1 Measures of Center

The mean has shifted towards the extreme value.

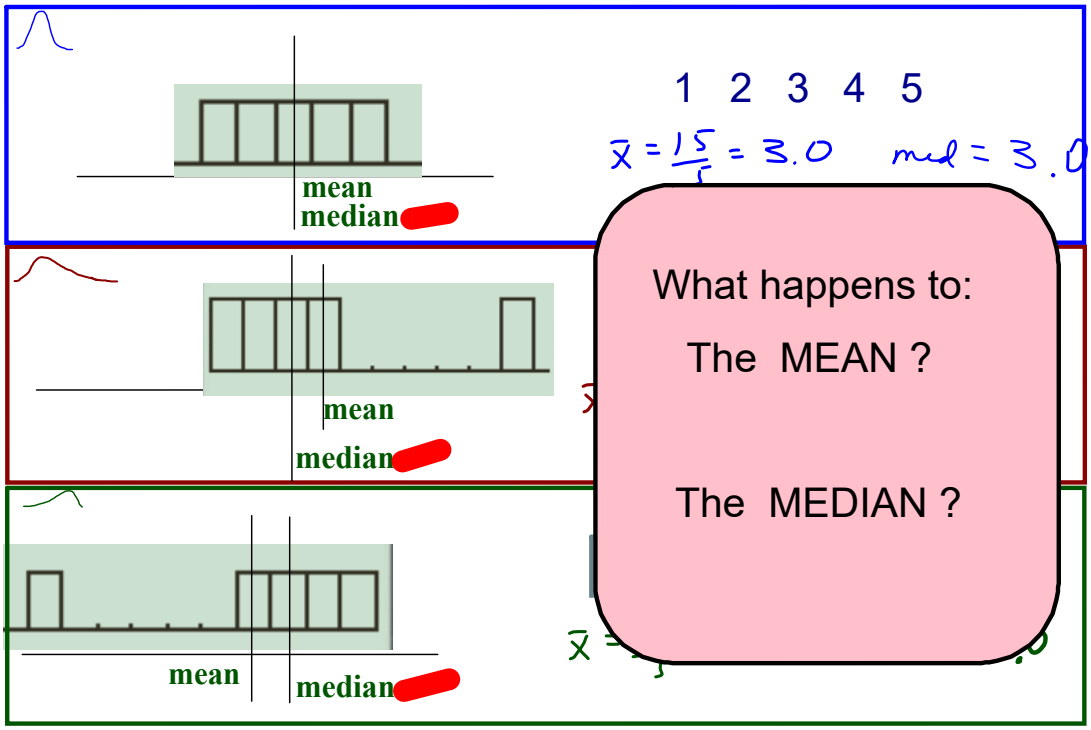


Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Quantitative Data

3.1 Measures of Center

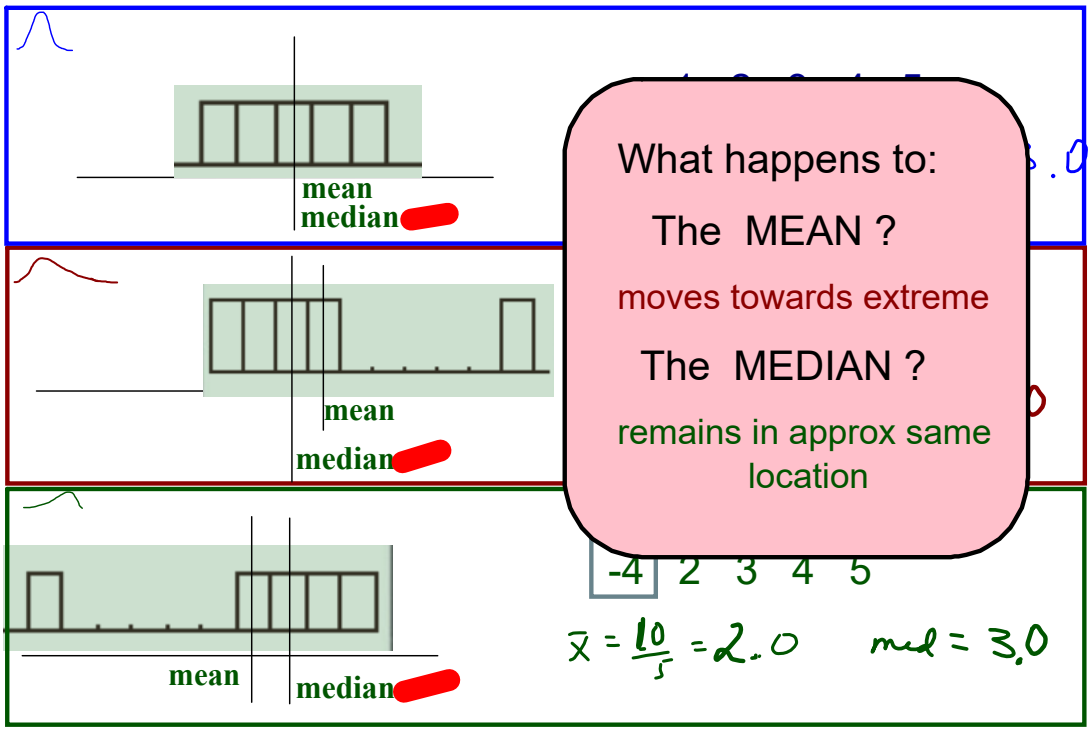


Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Quantitative Data

3.1 Measures of Center



Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Quantitative Data

3.1 Measures of Center

Resistant Measure: not as sensitive to extreme observations; stays about the same

median resistant

mean NOT resistant:

Mean moves toward extreme values

can trim and compute trimmed mean:
need to remove extremes from both ends

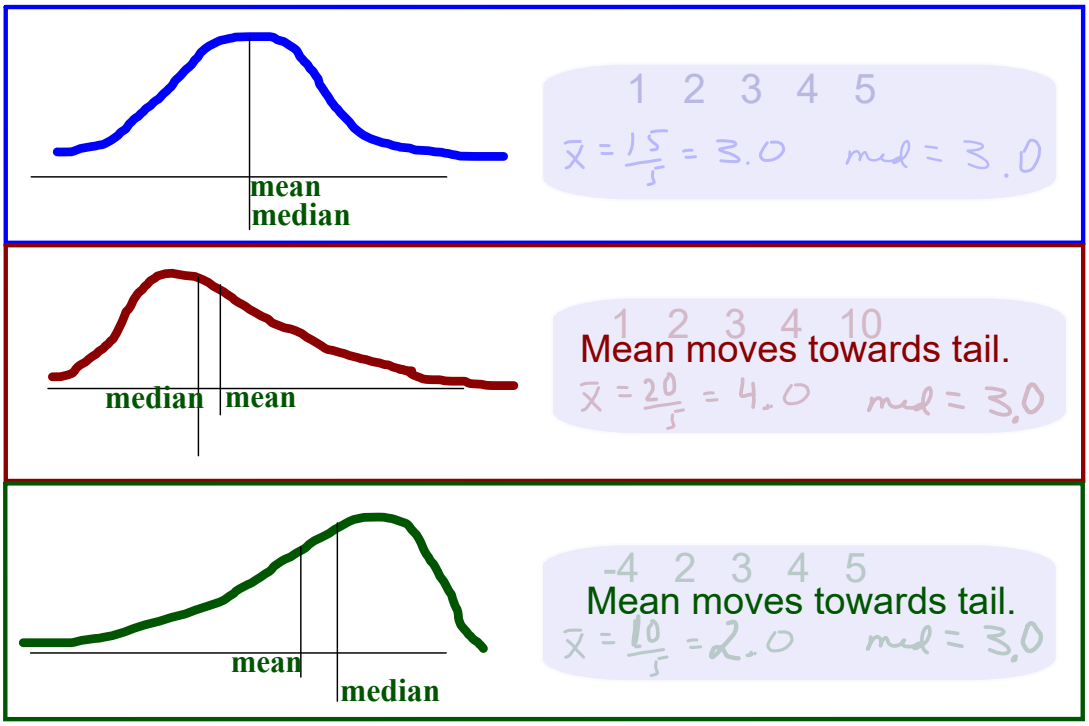
Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Problems

3.1 Measures of Center

Generalize to representative distributions:
The mean lies between the median and the extreme value.



Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Quantitative Data

3.1 Measures of Center

F: mean, median, mode

Exercise 3.16 Impact of Hurricane Hugo (See xls file)

NH3 flux kg/hectare/yr
96
116
66
57
147
154
147
88
175
154

Mean: $\frac{\Sigma \text{ of observations}}{\text{No. of observations}}$

Median: sequence data first, then find middle value
(Use calc & sort)

Median: easiest from sorted list

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Sep 15-3:54 PM

3.1 Measures of Center

Exercise 3.16 Impact of Hurricane Hugo (See xls file)

NH3 flux kg/hectare/yr
96
116
66
57
147
154
147
88
175
154

1200

57, 66, 88, 96, 116 | 147, 147, 154, 154, 175

$\bar{X} = \frac{\Sigma x}{n} = \frac{\quad}{\quad} =$

1 more decimal place than original data

median: sequence data 1st, then find middle value

med = ____

$= \frac{263}{2} =$

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Sep 15-3:54 PM

3.1 Measures of Center

Exercise 3.16 Impact of Hurricane Hugo (See xls file)

NH3 flux kg/hectare/yr
96
116
66
57
147
154
147
88
175
154

1200

57, 66, 88, 96, 116 | 147, 147, 154, 154, 175

$\bar{X} = \frac{\Sigma x}{n} = \frac{1200}{10} = 120.0$

1 more decimal place than original data

median: sequence data 1st, then find middle value

$med = \frac{116+147}{2}$

$= \frac{263}{2} = 131.5$

med = 131.5
mean = 120.0
mode = 154, 147

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Sep 15-3:54 PM

3.1 Measures of Center

Exercise 3.16 Impact of Hurricane Hugo (See xls file)

NH3 flux kg/hectare/yr
96
116
66
57
147
154
147
88
175
154

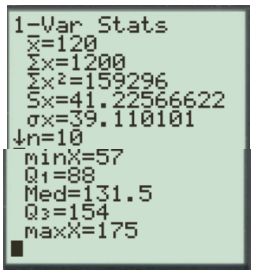
1200

57
66
88
96
116
147
147
154
154
175

Calculator Instructions

General Statistics - mean, median, stdev, quartiles, etc

STAT / EDIT
1. Edit
Enter data into L1 (or other)
STAT / CALC
1: 1-Var Stats
Returns: $\bar{x}$, Σx, Σx^2, s, σ, n,
minX, Q1, Med, Q3, maxX



Class Notes: Prof. G. Battaly, Westchester Community College, NY
Statistics Home Page Class Notes

Sep 15-3:54 PM

3.1 Measures of Center

Exercise 3.16 Impact of Hurricane Hugo (See xls file)

NH3 flux kg/hectare/yr
96
116
66
57
147
154
147
88
175
154

1200

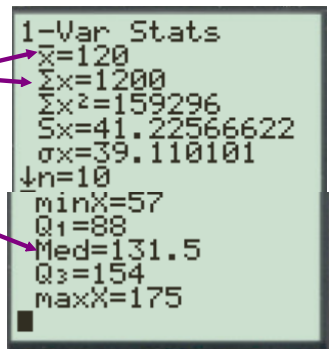
57
66
88
96
116
147
147
154
154
175

Calculator Instructions

General Statistics - mean, median, stdev, quartiles, etc

STAT / EDIT
1. Edit
Enter data into L1 (or other)
STAT / CALC
1: 1-Var Stats
Returns: $\bar{x}$, Σx, Σx^2, s, σ, n,
minX, Q1, Med, Q3, maxX

mean = 120.0
med = 131.5
mode = 154, 147



Class Notes: Prof. G. Battaly, Westchester Community College, NY
Statistics Home Page Class Notes

Sep 15-3:54 PM

3.1 Measures of Center

Technical Merit: Figure Skating

5.8
5.7
5.9
5.7
5.5
5.7
5.7
5.7
5.6

Find:
mean ..... Always Include: equation Σx/n
median ..... sorted list
mode

Mean: $\frac{\Sigma \text{ observations}}{\text{No. of observations}}$

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Sep 15-3:54 PM

3.1 Measures of Center

Technical Merit: Figure Skating

Find:
mean ..... Always Include: equation Σx/n
median ..... sorted list
mode

5.8	5.5
5.7	5.6
5.9	5.7
5.7	5.7
5.5	5.7
5.7	5.7
5.7	5.7
5.7	5.8
5.6	5.9
	51.3

Mean: $\frac{\Sigma \text{ observations}}{\text{No. of observations}}$

n = 9 odd, so median is 5th item in sequence

med. = 5.7

$\bar{x} = \frac{\Sigma x}{n} = \frac{51.3}{9}$

$\bar{x} = 5.70$

mode: 5.7

Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Sep 15-3:54 PM

3.1 Measures of Center

Find:
mean ..... Always Include: equation $\Sigma x/n$
median ..... sorted list
mode

Technical Merit: Figure Skating

Mean: $\frac{\Sigma \text{ observations}}{\text{No. of observations}}$

5.8	5.5
5.7	5.6
5.9	5.7
5.7	5.7
5.5	5.7
5.7	5.7
5.7	5.7
5.7	5.8
5.6	5.9
	51.3

$\bar{x} = \frac{\Sigma x}{n}$

$= \frac{51.3}{9}$

$\bar{x} = 5.70$

med. = 5.7

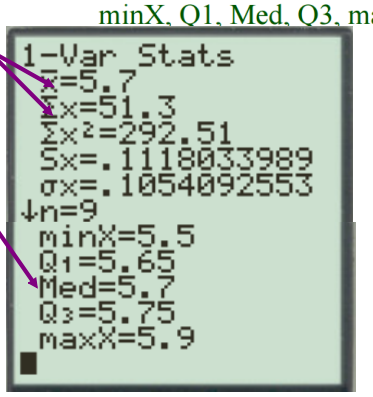
mode 5.7

$\bar{x} = \frac{\Sigma x}{n} = \frac{51.3}{9}$

Calculator Instructions

General Statistics - mean, median, stdev, quartiles

STAT / EDIT
1. Edit
Enter data into L1 (or other)
STAT / CALC
1: 1-Var Stats
Returns: $\bar{x}$, Σx, Σx^2, s, σ, n, minX, Q1, Med, Q3, maxX



Class Notes: Prof. G. Battaly, Westchester Community College, NY

Statistics Home Page Class Notes

Sep 15-3:54 PM