Topic 4: Examining Numerical Data

STOR 155: Introduction to Data Models and Inference

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Fall 2025

Announcements

Course PSAs:

- Homework 3 due **TODAY, Thursday 1/22 on WebAssign**
- Homework 4 due **Tuesday, 1/27 on WebAssign**
- **IMPORTANT:** UCO new system issues

Warm-Up:

- Think about something you might want to collect data on. Why does it interest you? What sorts of data would you be collecting?
- Share with a neighbor!

Practice Time! True/False

Which of the following statements regarding differences between experiments and observational studies are true?

a) Experiments take place in a lab, while observational studies do not need to.

b) In an observational study we only look at what happened in the past.

c) Experiments use random assignment while observational studies do not.

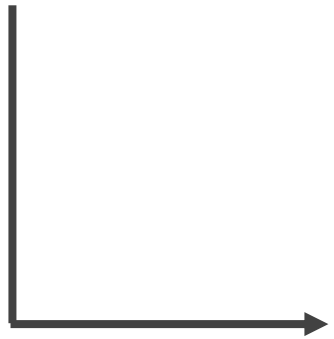
d) Observational studies are completely useless since no causal inference can be made based on their findings.

e) Experiments involve active intervention or treatment, while observational studies are passive.

Numerical Data and Histograms

IQ test scores for 60 randomly chosen fifth-grade students

145	139	126	122	125	130	96	110	118	118
101	142	134	124	112	109	134	113	81	113
123	94	100	136	109	131	117	110	127	124
106	124	115	133	116	102	127	117	109	137
117	90	103	114	139	101	122	105	97	89
102	108	110	128	114	112	114	102	82	101



Bin	Frequency
80 – 89	3
90 – 99	4
100 – 109	14
110 – 119	17
120 – 129	11
130 – 139	9
140 - 149	2

Histograms

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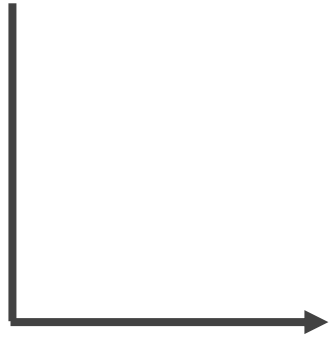
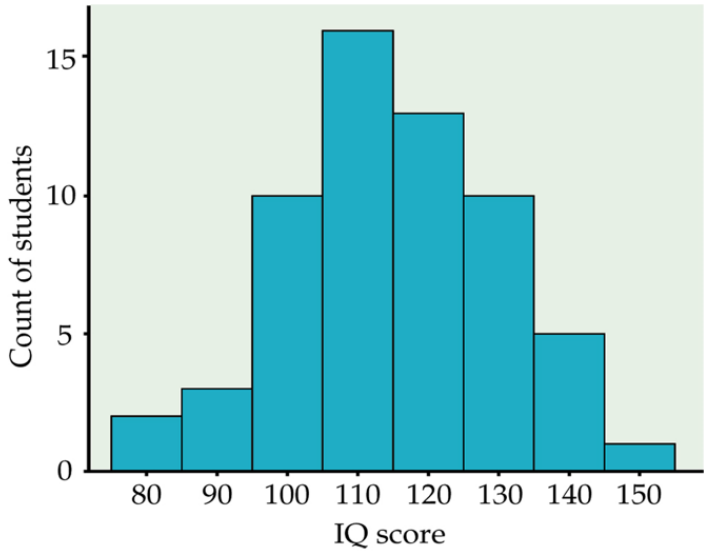
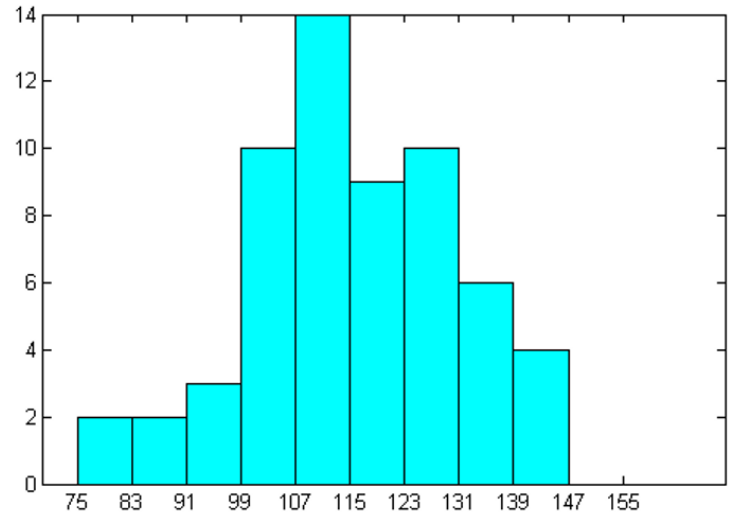
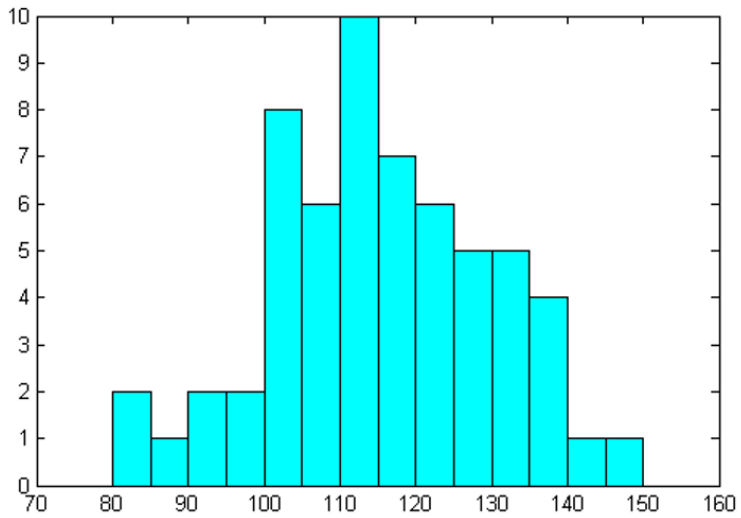


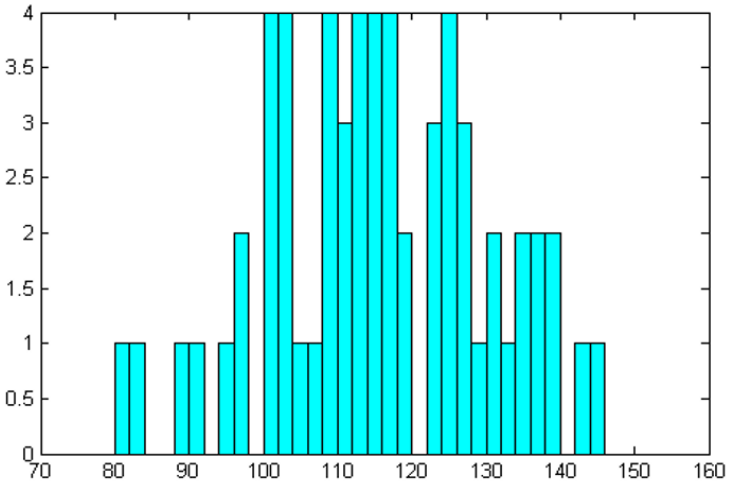
Bin	Frequency
75-84	2
85-94	3
95-104	10
105-114	16
115-124	13
125-134	10
135-144	5
145-154	1

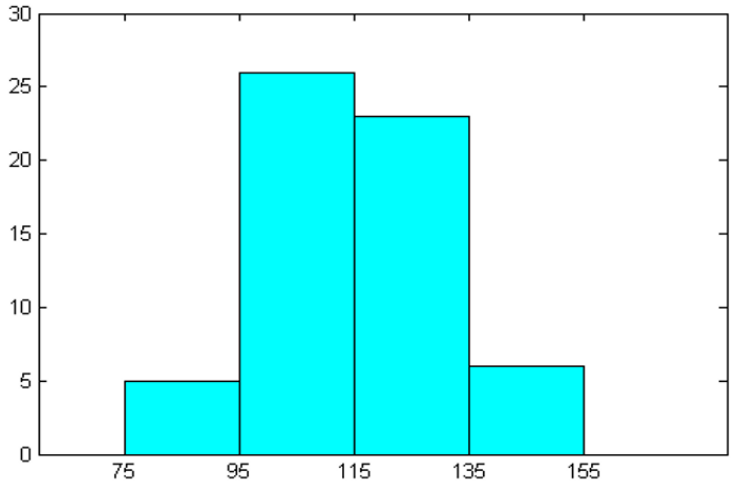


What Belongs in the Bin?



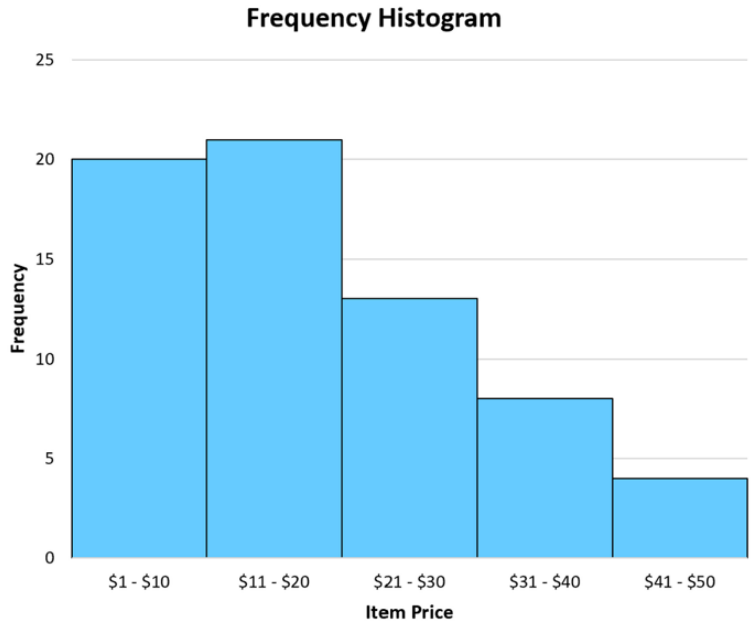


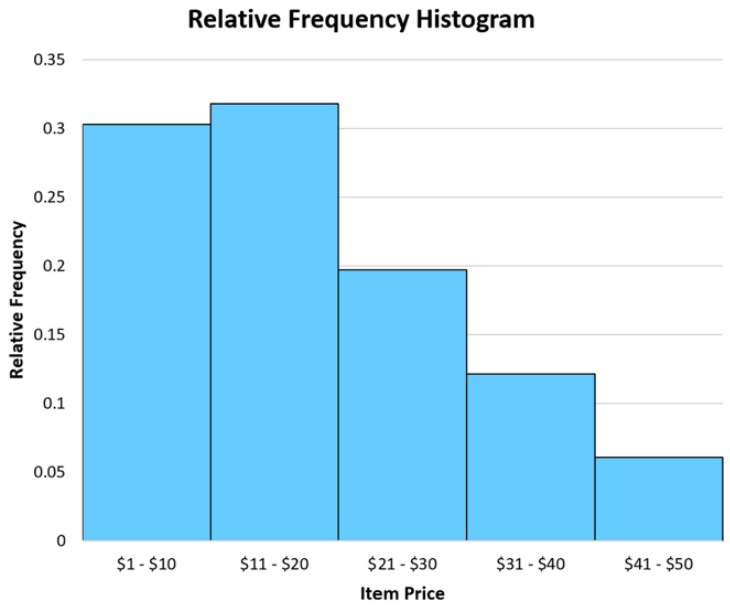




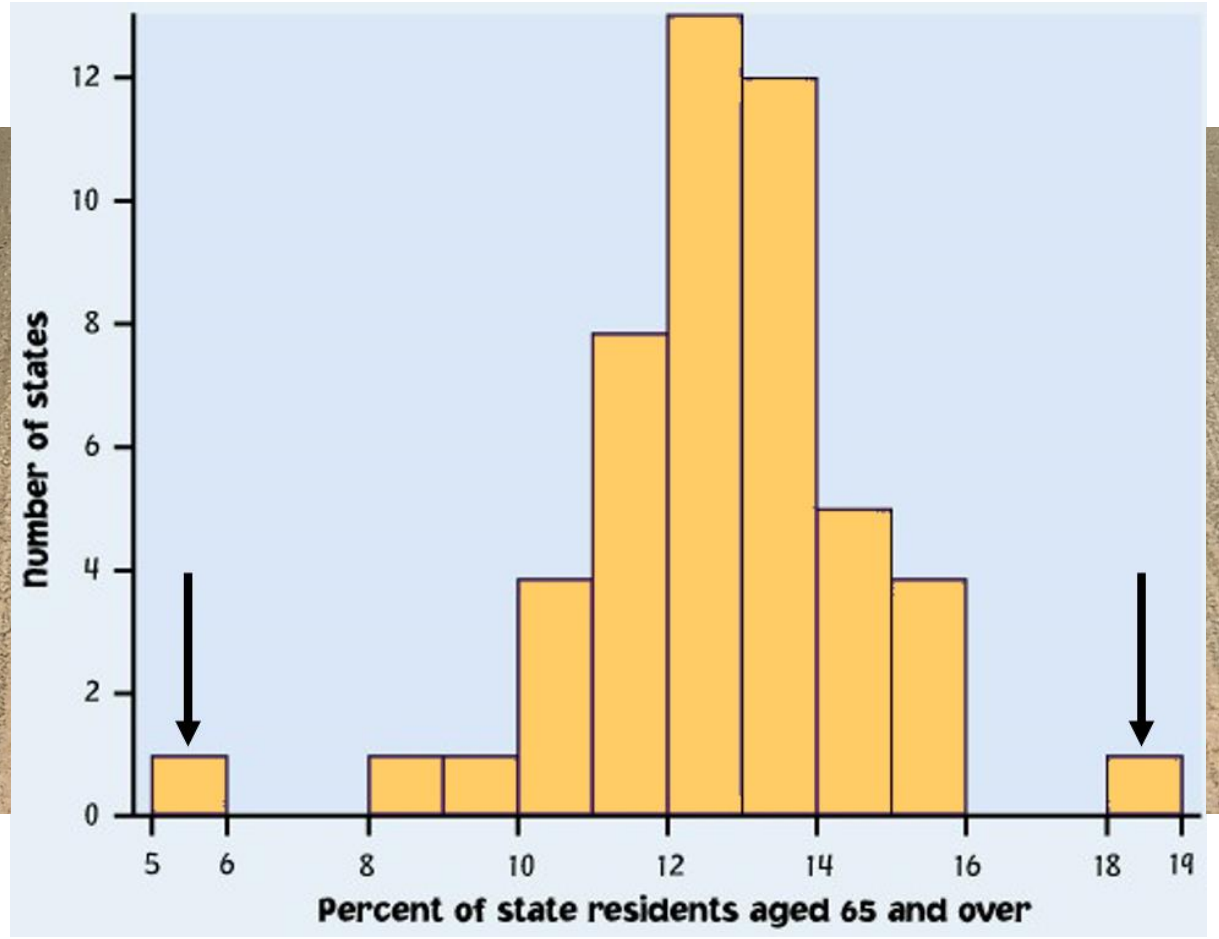
Relative Frequencies

Item Price	Frequency	Relative Frequency
$1 – $10	20	0.303
$11 – $20	21	0.318
$21 – $30	13	0.197
$31 – $40	8	0.121
$41 – $50	4	0.061





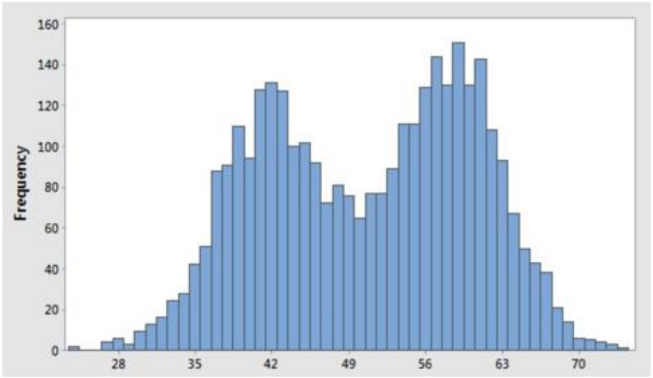
Identifying Outliers

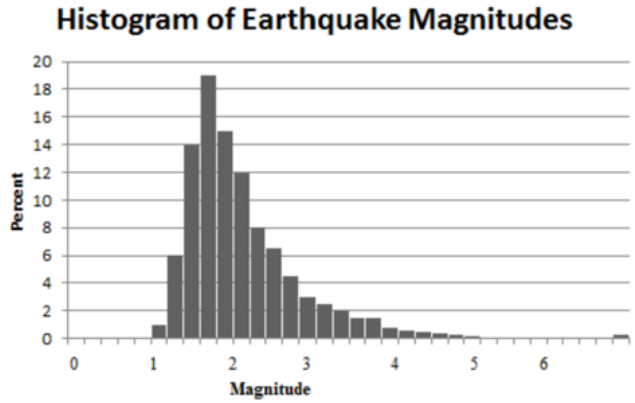


Describing Distributions

4 Key Characteristics:

- Shape
- Center
- Spread
- Outliers





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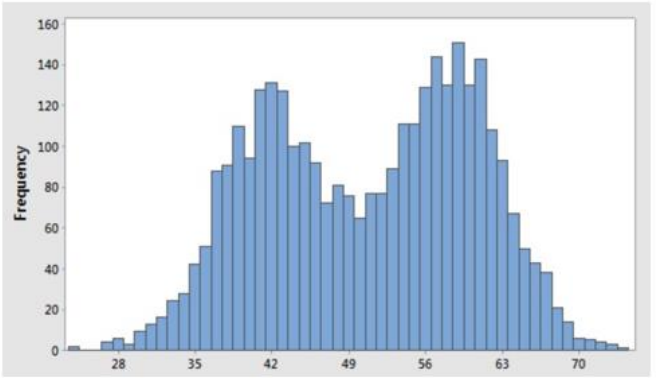
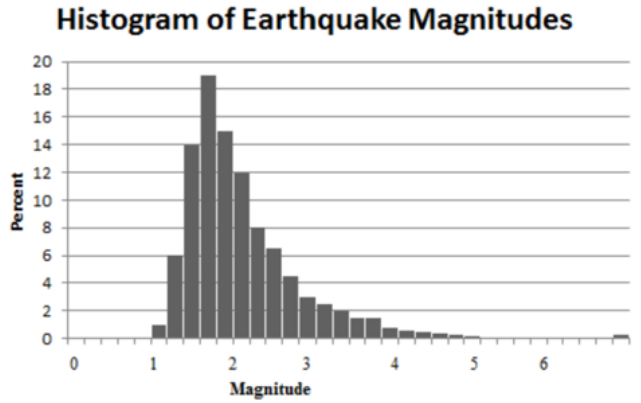
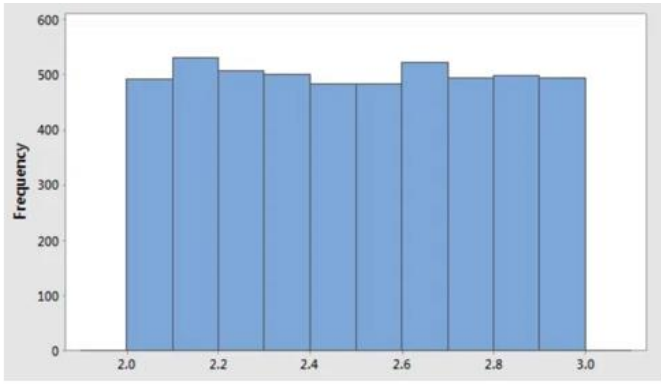






Birthday Party!

A birthday party has 9 attendees of the following ages:

7, 1, 3, 4, 4, 6, 3, 5, 3

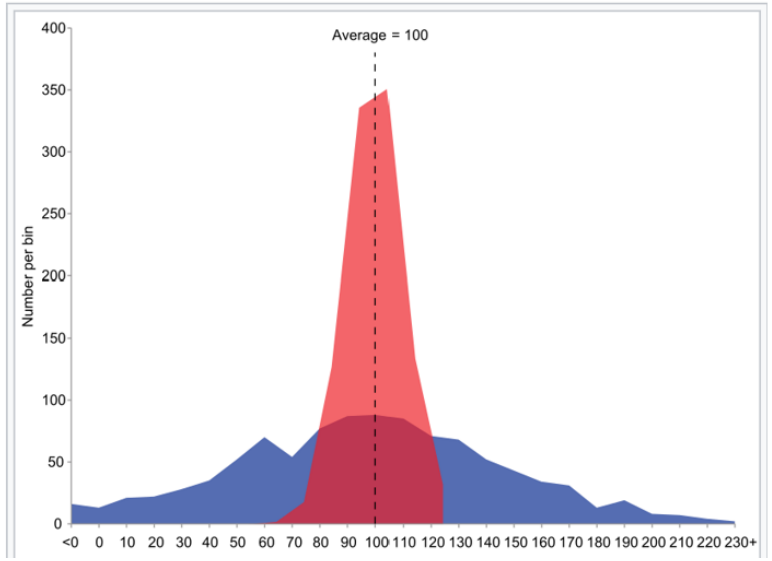
- Notation
- Measures of Center
- Effect of Outliers ⟶ **...64?**

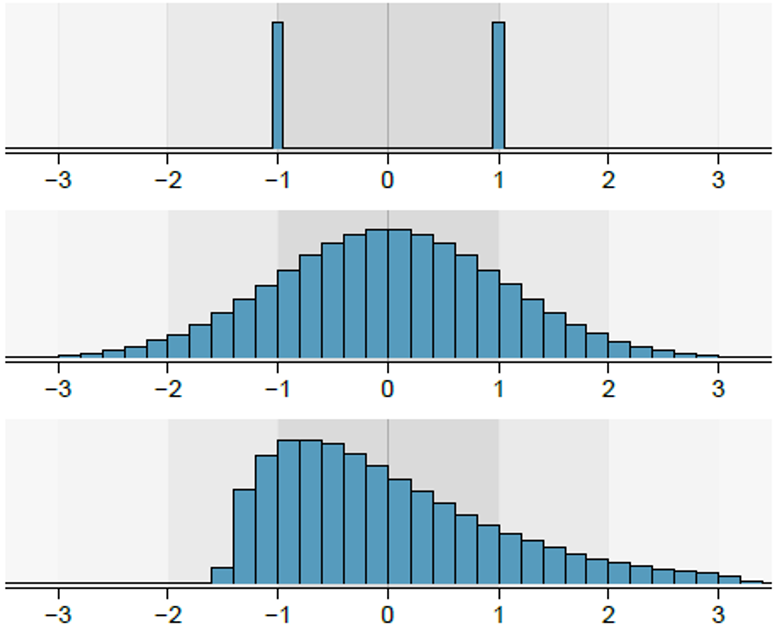
Measures of Spread

A birthday party has 9 attendees of the following ages:

7, 1, 3, 4, 4, 6, 3, 5, 3

- Variance and standard deviation





Measures of Spread

A birthday party has 9 attendees of the following ages:

7, 1, 3, 4, 4, 6, 3, 5, 3

- Interquartile range (IQR)
- Specific criteria for outliers
- 5-number summary
- Box plot representation