

Stem-and-Leaf Displays

Chapter 6 Test Scores

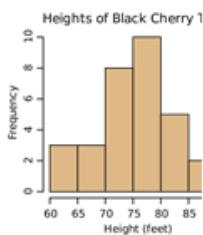
Class A		Class B	
Stem	Leaves	Stem	Leaves
4	9	4	
5	5, 7	5	2, 7
6	6, 6, 8	6	2, 5, 8, 8
7	2, 8, 8, 8	7	2, 5
8	4, 5, 7, 8, 8	8	1, 4, 5, 7, 7
9	1, 5, 5	9	0, 1, 1, 5, 5, 5
10	0, 0	10	0

Stem-and-Leaf Displays

Stem-and-Leaf Displays are wonderful for small datasets because they are easy to make and read

- = Leaves are best as one digit (round, truncate if needed)
- = Preserves the data
- = Don't forget a TITLE and a KEY!
- = Reorder leaves into numerical order!
- = If each digit takes up the same amount of space, the graph will satisfy the area principle

Histograms

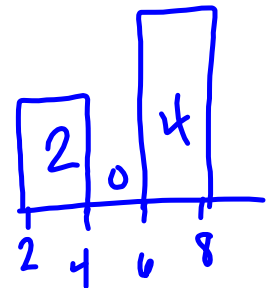


Histograms

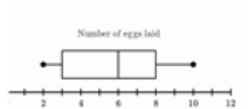
Histograms display frequencies per "class" (or bin)

- = Each bin is of equal width
- = No space between bars
- = Rule of Thumb – 5-15 classes
- = LABEL and SCALE the axes!

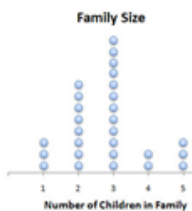
Relative Frequency Histogram – displays relative frequency for each class



Boxplots



Dotplots



Boxplots

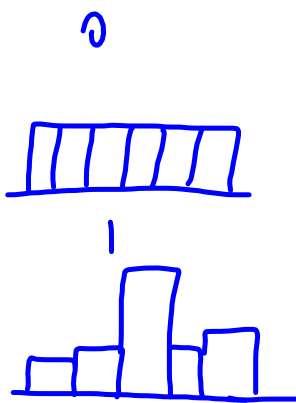
Use the 5 number summary to show the spread of the data.

- ⇒ Find the 5 number summary in calculator
- ⇒ Create a number line
- ⇒ Place 5 values on number line
- ⇒ Connect 3 middle points for box and the two outer as whiskers.

Dotplots

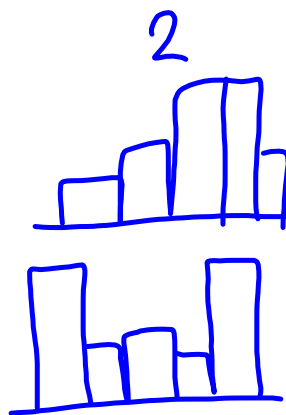
A dotplot is a simple display that uses dots for each data value along a number line.

- ⇒ Best for small datasets
- ⇒ Easily shows details such as min, max, gaps, peaks, and clusters
- ⇒ Be sure to LABEL the axis!



Shape

S



Shape

Does the histogram (or stem-and-leaf display) have a single, central hump or several separated bumps? These humps are called modes.

- * 0 modes—uniform
- * 1 mode—unimodal
- * 2 modes—bimodal
- * 3+ modes—multimodal

Is it symmetric? Can you fold it along a vertical line through the middle and have the edges match pretty closely, or are more of the values on one side?

The (usually) thinner ends of a distribution are called the tails. If one tail stretches out farther than the other, the histogram is said to be skewed to the side of the longer tail.

Center

C

Center

If you had to pick a single number to describe all the data, what would you pick?

If the distribution is unimodal and symmetric, the center is right in the middle.

If the distribution is skewed or has more than one mode, defining the center is a challenge or might not even be a useful concept. For now, we'll just eyeball a picture of the distribution and give a rough idea of where the center seems to be.

Centers are mean, median, mode

Outliers

Outliers

Do any unusual features stick out?

You should always mention any stragglers, or outliers, that stand off away from the body of the distribution. An outlier can be the most informative part of your data.

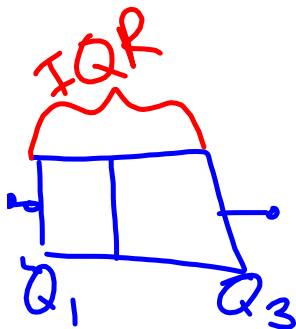
If it seems roughly symmetric, then stragglers are best regarded as outliers. If the main part of the data is skewed, then the long tail that continues that skewness is part of the overall pattern and probably not full of outliers.

Are there any gaps in the distribution?

Gaps help us see different modes and encourage us to notice when the data may come from different sources or contain more than one group.

Formula for outliers $Q_1 - 1.5(IQR)$
 $Q_3 + 1.5(IQR)$

O Lowest Value
 $Q_1 - 1.5(IQR)$
 Highest
 $Q_3 + 1.5(IQR)$



Spread

Spread

Variation matters. We must look to see whether all the values are tightly clustered around the center or spread out.

What is the range of the values? How far apart are the two extremes?

Range = maximum value - minimum value

What is the interquartile range of the values? How far apart are the two quartiles?

IQR = third quartile value - first quartile value

What is the Standard Deviation of the values? How far apart are the values from the mean?

S Interquartile Range
 $Q_3 - Q_1$

Variance: $(\text{St. dev})^2$

Calculator Directions for Stats Unit

TI-83/84 Graphing

Step 1. Press the key that reads: STAT.

```

2nd [CALC TESTS]
1:Edit
2:SortA(
3:SortD(
4:C1rList
5:SetUpEditor
    
```

Step 2. Press the key that reads: ENTER.

```

L1 L2 L3 1
-----
L1D=
    
```

Step 3. Record your data on list 1 (L1).

```

L1 L2 L3 1
-----
1470
2200
799
1699
895
1280
2495
L1D=1500
    
```

FINDING FIVE-NUMBER SUMMARY.

Step 1. When you are done, press STAT.

```

2nd [CALC TESTS]
1:Edit
2:SortA(
3:SortD(
4:C1rList
5:SetUpEditor
    
```

Step 2. Go to CALC.

```

EDIT [CALC TESTS]
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7:QuartReg
    
```

Step 3. Highlight the option: 1-Var Stats, then press ENTER.

1-Var Stats

Step 4. Press 2nd and 1 to choose the name for list 1 then press ENTER.

1-Var Stats L1

You should see something like this:

```

1-Var Stats
x̄=1441.636364
sx=31216
sx²=67266700
Sx=1012.863952
σx=989.5766104
n=22
    
```

Scroll down and... We are done with it!

```

1-Var Stats
n=22
n100=619
Q1=725
Med=1016
Q3=1699
maxX=4450
    
```

Calculator Directions for Stats Unit

TI 36X Pro AND TI-30XS

1. DATA (type in data)
2. 2nd DATA
3. 2: 1-Var Stats
4. Choose your list L1
Frequency One
Arrow down to calc
Press enter
5. 1: n= number of data pieces
6. 2: \bar{x} = mean 7: min X = min value
- 7.8: Q1 9: Median Q3 Max X =Max value

\bar{X} = mean

σ_x = Standard deviation

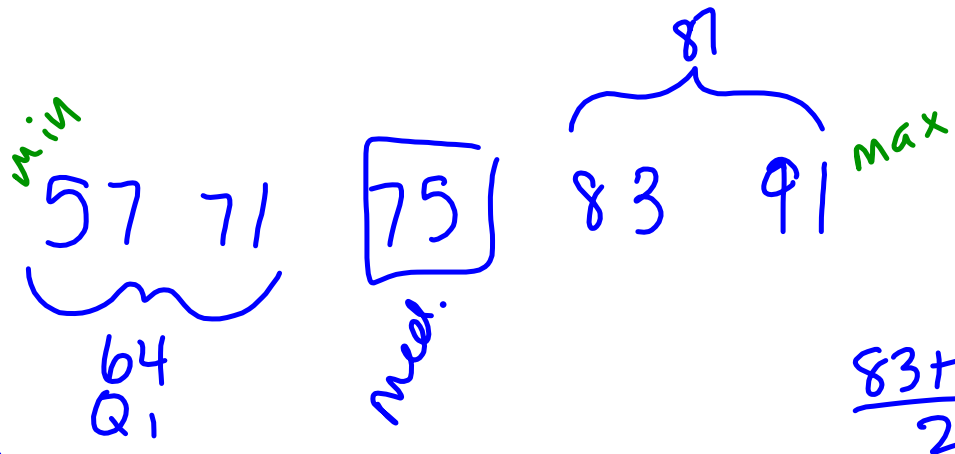
Variance = $(\sigma_x)^2$

min —

Q_1 = first
med = median

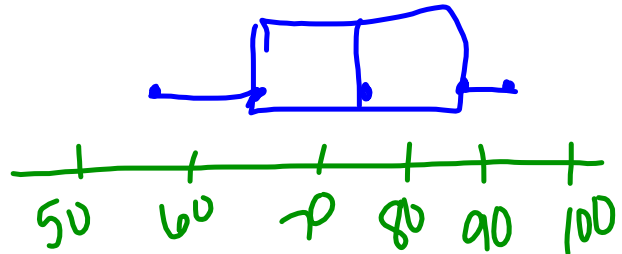
Q_3 = third quartile

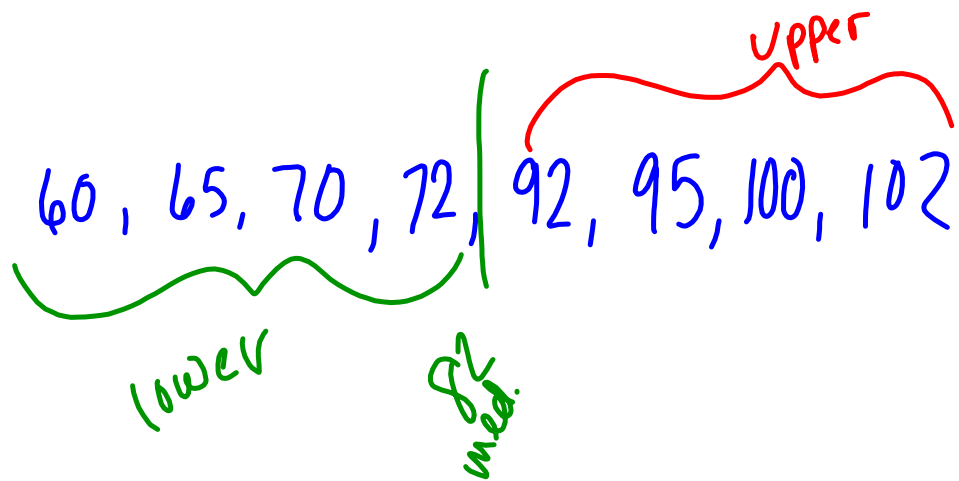
max —



$Q_1 = \text{median}$
of
lower half

$Q_3 = \text{median}$
of
upper half





90, 92, 81, 57, 34, 56

34, 56, 57, 81, 90, 92

Q_1 Q_3

67

$$IQR = 90 - 56$$

