Math-3A
Lesson 11-1

Statistics:
Measure of "Central Tendency"

Statistics: The numerical values used to summarize and compare sets of data.

Data: A collection of measurements of a certain type:

Examples:
- Income
- Age
- Unit 6 Test Scores

middle →

105
100
100
100
95
90
85
80
80
75
75
75
75
75
70
65
55
50
50
50
45
35

spread

Categories of Statistics:
- where is the middle of the data?
- how far is the data spread apart?

How can we find the "middle" of the data?

105			107
100			107
100			107
100	91	88	107
95	86	79	107
90	86	68	93
85	86	60	93
80	82	55	93
80	82	48	93
75	82	44	93
75	77	33	93
75	77	33	93
75	73	25	93
75	68	25	86
70	68	25	86
65	64	21	79
55	64	13	64
50	50	13	57
50	45	13	57
50		13	43
45		11	36
35			14

Measure of Central Tendency: a number used to represent the "center" or "middle" of the data set.

Mean is a measure of central tendency.

Mean: what you would normally call the "average".

Add all the data together then divide by the number of data points.

$$Mean = \frac{x_1 + x_2 + \ldots + x_n}{n} \qquad \bar{x} = \frac{x_1 + x_2 + \ldots + x_n}{n}$$

"x-bar"

Grades for 4 different tests.

Mean (average) grade for each:

74 % →

105
100
100
100
95
90
85
80
80
75
75
75
75
70
65
55
50
50
50
45
35

74 % →

91
86
86
86
82
82
82
77
77
73
68
68
64
64
50
45

31 % →

88
79
68
60
55
48
44
33
33
25
25
25
21
13
13
13
13
11

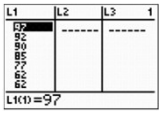
81 % →

107
107
107
107
93
93
93
93
93
93
93
86
86
79
64
57
57
43
36
14

Let's use the calculator

Enter the data into a list
→ "Stat" then "edit" option.

Enter the data into list "L1".



"stat" then scroll over to "calc"

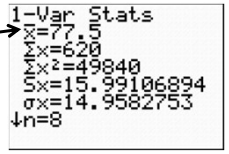
Option 1: 1-var stats then "enter"

Find the mean of the following data.

{ 2, 3, 5, 7, 9, 11}

$$\bar{x} = \frac{2+3+5+7+9+11}{6} = 6.17$$

Mean: →



Median: the number that is the middle number of the data set.

median: half of the data points are above this value and half are below this value.

Odd number of data: 4, 6, (8), 10, 12

Even number of data: 3, 4, (6, 8), 10, 12

For an even number of data, take the mean of the numbers above and below the middle position.

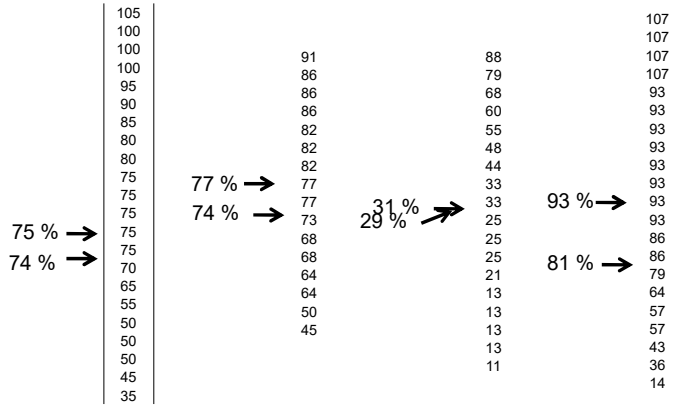
→ median = 7

Utah Median Family Income by Family Size

# People	Median Income
1 Earner	$45,724
Family Size	
2 People	$51,583
3 People	$58,285
4 People	$65,397

Average grade for each:

Median grade for each:



Mode: the number in the data set that occurs most frequently.

Data set: 1, 2, 4, 4, 6, 8, 8, 8, 10, 12

Frequency of occurrence: 4 (occurs 2 times),
8 (occurs 3 times),
all the rest (occur only once)

Mode = 8

Mode: the number in the data set that occurs most frequently.

Data set: 1, 2, 4, 4, 6, 8, 8, 10, 12

Frequency of occurrence: 4 (occurs 2 times),
8 (occurs 2 times),
all the rest (occur only once)

Mode = 4 and 8

Outlier: A data point that is much greater or much lower than most of the other data points.

Outliers tend to give misleading impression about a data set.

100
79
69
65
57
52
44 ← 39 %
37
33 ← 35 %
25
25
25
21
13
13
13
13
10

100 is 21 points above 79. All other points are within 10 points of the adjacent data point.

If we "throw out" the outlier (it not being a representative grade for this test/group) see how the mean is effected.

Average grade:

Median grade:

When you compare the mean with the median, you can see if the data is "skewed"

105
100
100
100
95
90
85
80
80
75
75
75 % → 75
74 % → 75
70
65
55
50
50
50
45
35

107
107
107
107
93
93
93
93
93
93
93 % → 93
93
93
86
81 % → 86
79
64
57
57
43
36
14

The mean is very sensitive to outliers (as it factors in their magnitude),

while the median is resistant to outliers."

Measure of Central Tendency: a statistic used to represent the "center" or "middle" of the data set.

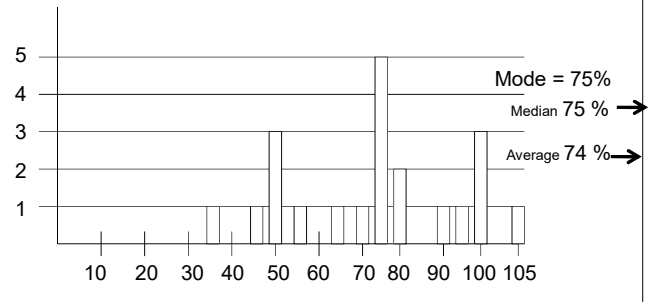
mean — the average of the data measurements.

the difference between the greatest and least data point.

median — the middle number in the data set.

mode — the data point that occurs most frequently in the data set.

Frequency Distribution graph:



105
100
100
100
95
90
85
80
80
75
75
75
75
75
70
65
55
50
50
50
45
35

# of occurrences	1	1	3	1	1	1	5	2	1	1	1	3	1
Grade	35	45	50	55	65	70	75	80	85	90	95	100	105

Data Distribution