Descriptive Statistics:

Describes, organizes, and presents data(information) about populations and samples.

Inferential Statistics:

Draws conclusions about populations based upon samples.

This class focuses on descriptive statistics!

Frequency Distribution:

A table that lists all the values of a data set along with their respective frequencies.

Data Set: $\{11,12,12,11,15,14,13,12,11,11\}$

Value	Frequency
11	**4**
12	3
13	1
14	1
15	1
Total	10

Relative Frequency Distribution:

A table that lists all the values of a data set along with their respective relative frequencies.

Value	Frequency	Relative Frequency	Percent Frequency
11	**4**	$\frac{4}{10}=.4$	**40%**
12	**3**	$\frac{3}{10}=.4$	30%
13	**1**	$\frac{1}{10}=.1$	10%
14	**1**	$\frac{1}{10}=.1$	10%
15	**1**	$\frac{1}{10}=.1$	10%
Total	**10**	**1**	**100%**

Grouped Frequency Distribution:

Disjoint classes(ranges) are established for the data values. The grouped frequency distribution lists all the classes along with their respective frequencies.

Data Set: $\{10, 21, 22, 12, 50, 42, 33, 20, 15, 17\}$

Class	Frequency
10-19	**4**
20-29	3
30-39	1
40-49	1
50-59	1
Total	10

There is a loss of detail in a grouped frequency distribution-the actual data values are lost!

Example:

Class	Frequency
10-19	6
20-29	8
30-39	4
40-49	5
50-59	2
Total	25

How many values in the data set are less than 20?

6

How many values in the data set are less than 25?

Can't tell; this information is lost because of grouping.

How many values in the data set are greater than 39?

7

How many values in the data set are greater than 50?

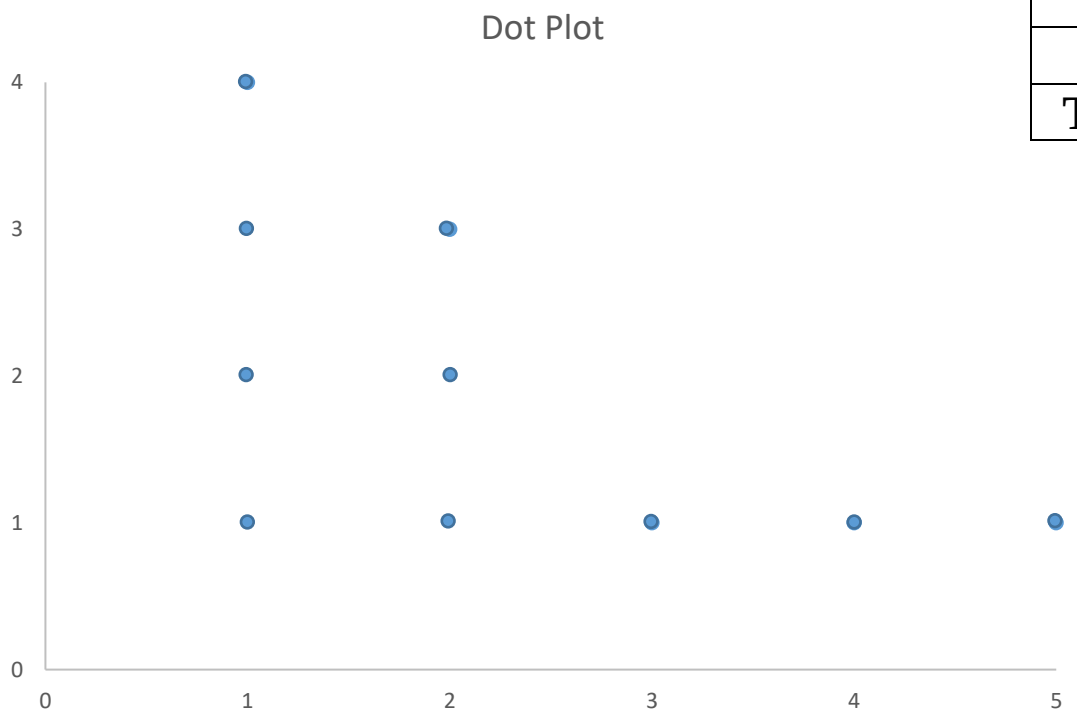
Can't tell; this information is lost because of grouping.

Graphs of frequency distributions:

Dot Plot:

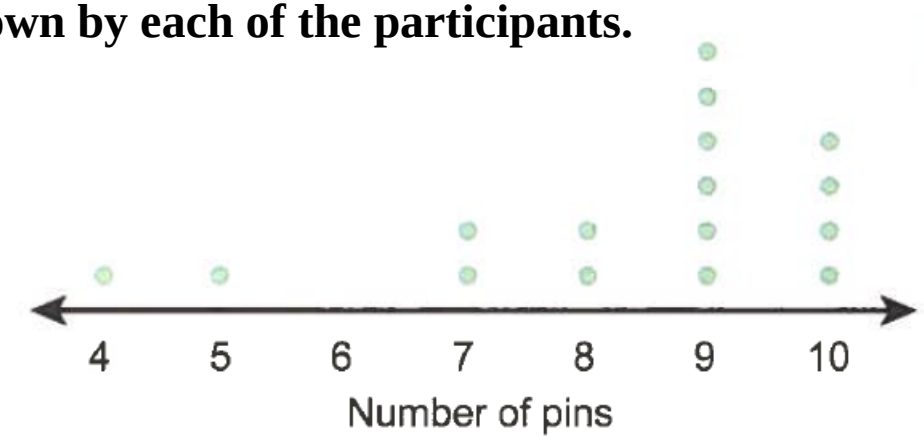
The number of vertical dots corresponds to the frequency.

Value	Frequency
1	4
2	3
3	1
4	1
5	1
Total	10



Allows easy visual determination of the most and least frequently occurring values!

Example: At a fund-raising event, participants got to roll one bowling ball down a lane. For every pin that a participant knocked down, the manager donated $2 to a charity. The following dot plot shows the number of pins knocked down by each of the participants.



1. How many participants were there?

16, just count the dots.

2. What was the fewest number of pins any participant knocked down?

4

3. How many participants knocked down at least 9 pins?

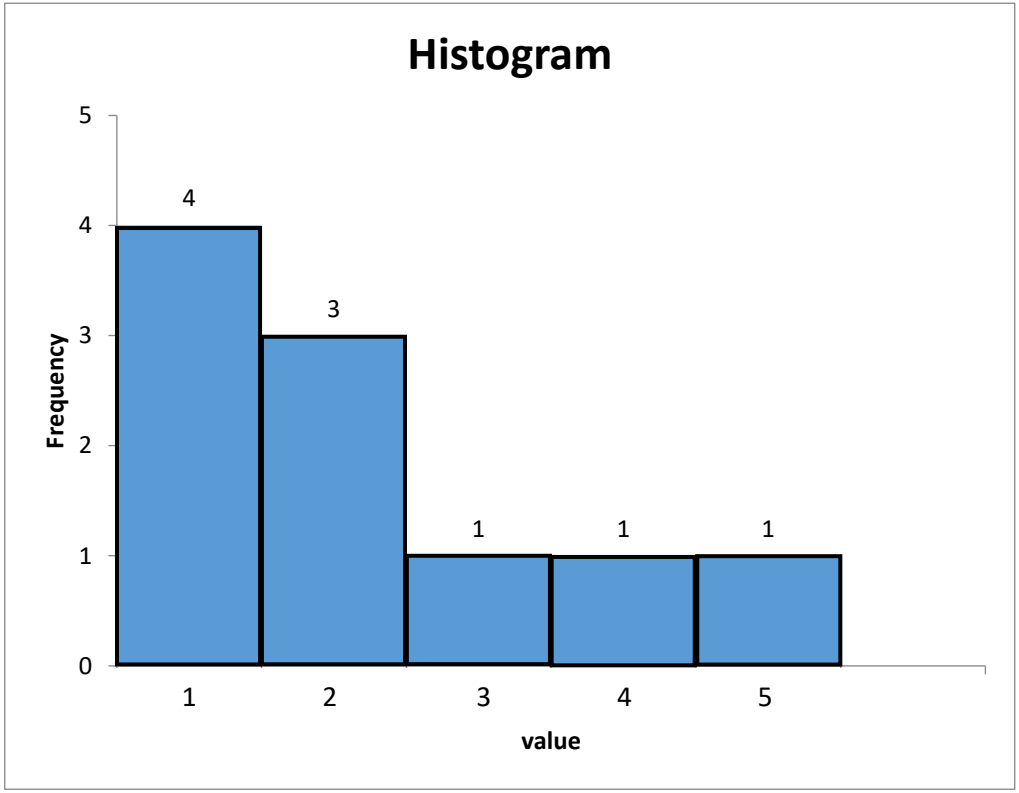
10

4. How many participants knocked down at most 7 pins?

4

Histogram:

Special bar graph where the bars are centered at the values, touch adjacent bars, and the height is the frequency.

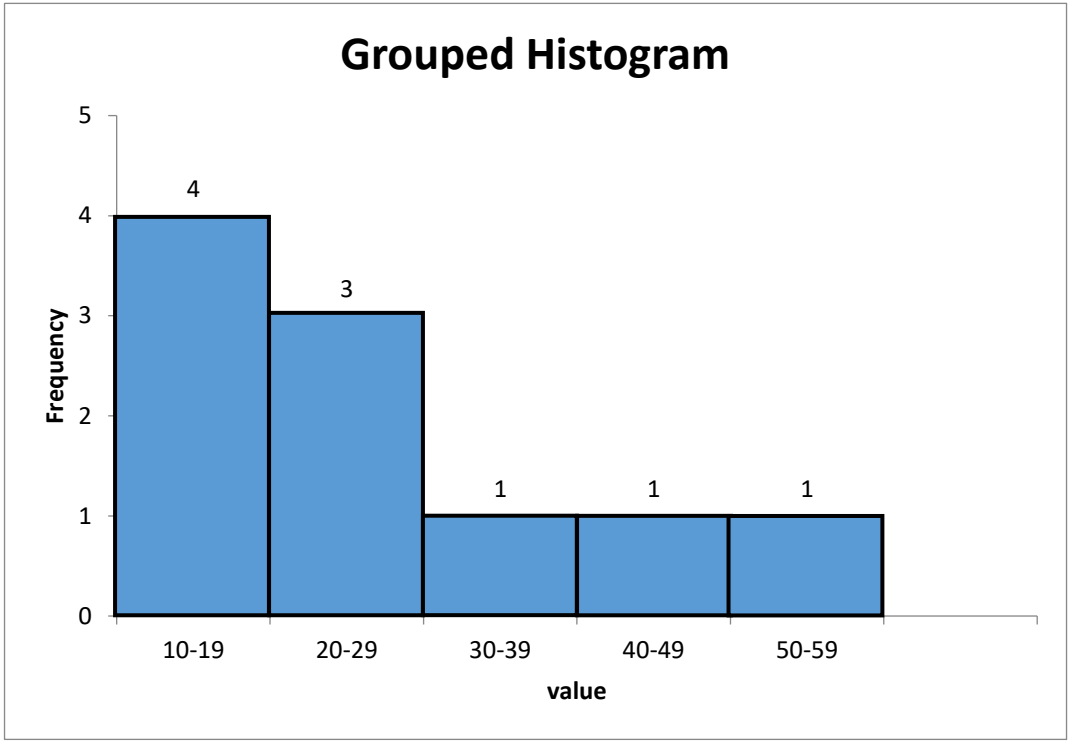


<u>Allows easy visual determination of the most and least frequently occurring values!</u>

Grouped Histogram:

Similar to a histogram

Class	Frequency
10-19	4
20-29	3
30-39	1
40-49	1
50-59	1
Total	10



Here is a data set consisting of 1,000 values from 0 to 9.

9	4	6	5	8	3	7	5	3	5
2	3	7	6	1	5	9	5	5	6
3	5	5	8	8	3	8	7	7	7
5	6	6	5	2	4	4	7	4	6
5	6	4	5	4	6	4	5	7	3
2	4	5	4	6	6	3	5	6	2
4	3	4	7	5	2	5	5	5	6
7	3	5	6	4	3	8	3	4	6
6	6	5	6	6	6	6	3	5	6
7	2	5	8	9	5	7	4	4	4
7	5	4	3	7	4	5	6	6	8
5	4	6	6	6	7	6	7	2	6
6	5	4	6	2	7	5	5	3	6
3	7	4	4	6	2	6	6	4	5
3	5	8	4	6	5	2	4	4	5
8	7	7	6	3	6	4	5	5	3
4	5	5	3	5	4	2	6	6	5
6	4	4	6	4	6	4	4	6	7
4	5	4	7	5	5	9	4	5	4
6	6	4	3	8	6	5	4	5	4
2	4	6	6	5	5	5	6	6	6
7	7	5	5	6	2	2	4	4	6
8	9	9	7	3	6	4	6	4	5
5	7	5	2	4	3	4	4	5	6
4	4	8	4	6	8	4	5	8	5
8	7	5	1	3	6	4	6	6	7

8	5	4	5	2	2	5	8	5	5
1	6	7	4	9	1	6	6	7	4
5	5	6	5	5	6	6	2	7	2
7	6	3	6	5	6	4	8	3	5
3	5	6	4	8	7	5	6	8	6
3	4	6	2	6	4	8	4	5	5
5	3	6	6	4	5	6	5	4	5
2	7	7	7	4	4	6	5	4	8
6	4	5	4	5	6	8	5	4	7
2	2	2	7	6	3	3	5	4	5
6	4	3	5	8	4	3	4	6	2
3	6	6	3	3	4	7	4	3	2
6	3	6	3	6	4	3	4	3	3
2	6	6	4	5	6	3	5	4	3
6	3	3	3	7	4	4	5	1	5
3	3	5	6	4	3	5	5	4	4
6	6	7	6	6	3	4	8	2	5
6	5	5	5	5	7	8	4	1	5
3	4	4	3	4	5	6	4	5	5
4	5	6	5	4	4	7	6	7	3
5	4	4	5	5	5	6	4	4	5
5	3	7	7	2	3	7	6	6	5
2	5	3	3	4	3	4	4	7	6
6	6	3	6	4	5	2	3	6	4
6	6	6	3	6	5	5	2	7	3
4	5	5	3	2	4	6	7	2	2
6	4	5	7	3	4	6	4	5	2
5	7	4	4	3	5	2	7	6	5
5	5	3	4	5	2	6	3	4	4
3	4	6	4	6	5	6	5	5	1

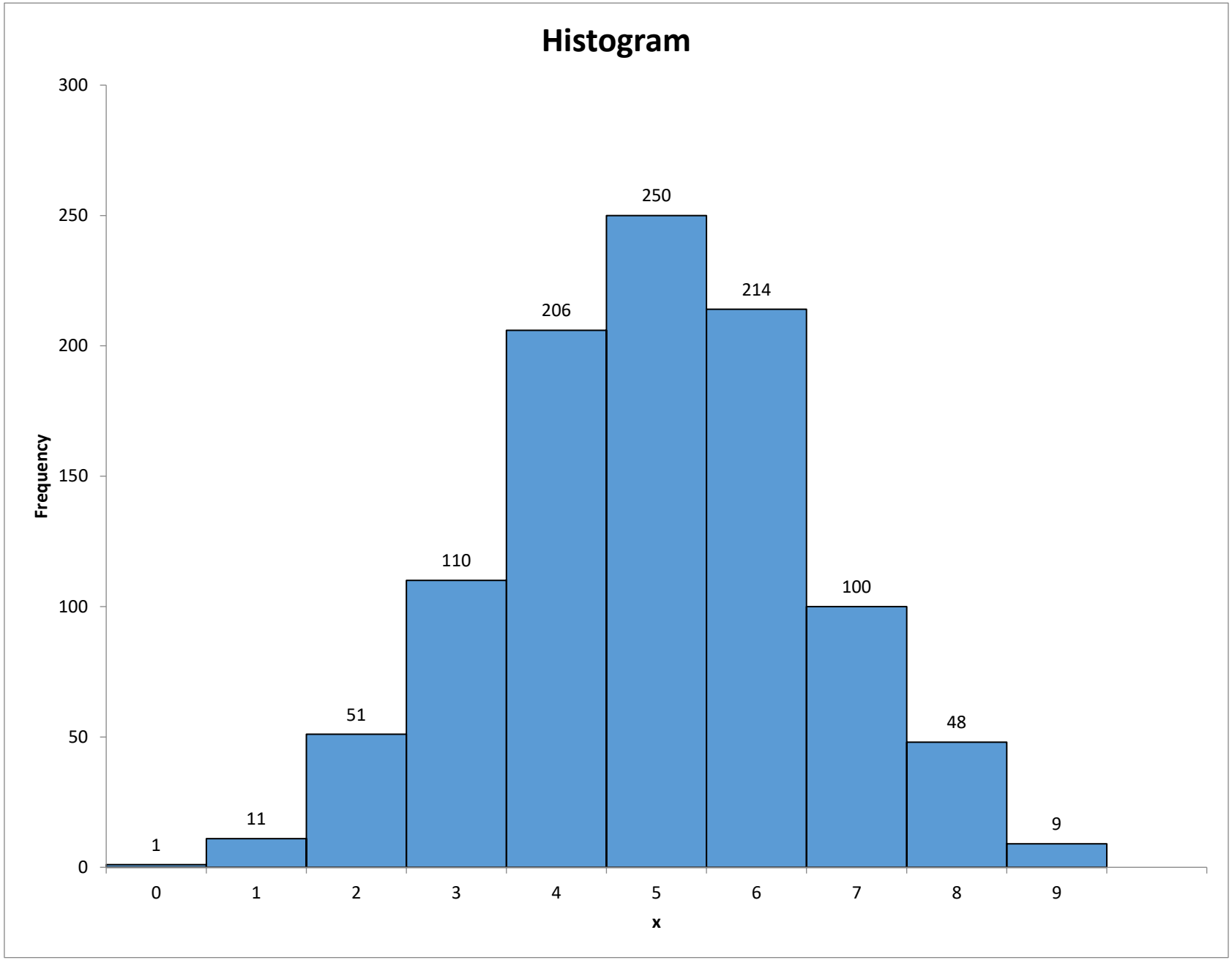
4	3	5	6	5	6	7	6	3	5
6	8	5	3	5	5	6	4	6	3
4	4	5	5	6	5	1	4	6	5
4	4	5	5	5	4	5	5	7	7
6	6	4	5	5	5	2	7	6	4
6	5	6	4	5	6	5	4	3	4
5	5	4	4	6	4	4	5	3	3
7	5	4	6	4	3	3	2	5	5
8	6	7	6	6	4	8	6	5	5
2	6	4	5	4	4	5	5	5	5
5	4	5	4	4	5	4	4	6	2
7	5	5	6	5	4	4	8	6	5
5	4	6	5	6	6	6	2	6	5
1	5	7	6	6	5	8	5	8	7
3	2	5	5	3	6	5	3	6	4
5	7	6	7	3	7	2	4	4	6
7	6	9	6	6	4	4	6	6	5
5	5	5	6	6	5	4	4	4	5
6	4	8	3	8	4	4	5	7	5
3	7	3	5	4	5	5	5	7	3
8	4	4	4	5	6	5	5	3	4
5	6	7	4	5	6	5	4	2	5
3	8	7	5	5	3	9	4	5	4
5	3	3	5	5	8	4	6	7	5
8	5	6	5	3	7	6	7	6	5
6	2	3	1	5	4	7	5	5	4
5	6	6	5	8	4	6	5	6	4
6	6	7	7	6	3	7	5	6	3
2	5	7	7	3	6	6	4	7	5
3	7	8	5	5	5	3	5	5	5

6	4	7	4	3	4	5	5	4	6
4	6	7	7	6	4	5	6	6	8
7	3	8	6	3	7	5	8	5	7
4	4	4	5	6	4	8	7	6	6
4	5	5	2	6	4	6	4	5	6
3	0	4	5	7	5	4	6	8	6
5	6	6	7	7	5	6	4	7	5
3	4	6	6	5	4	6	8	3	4
6	7	5	7	7	5	6	5	5	4
6	6	4	4	5	3	6	6	5	4
4	5	5	5	4	5	5	4	2	5
3	3	7	3	4	7	4	1	4	6
4	6	8	3	5	3	6	4	7	4
5	6	7	4	3	2	4	7	8	6

Excel can automatically construct a frequency distribution and histogram for this large data set.

x	*Frequency*
0	**1**
1	**11**
2	**51**
3	**110**
4	**206**
5	**250**
6	**214**
7	**100**
8	**48**
9	**9**
Total	**1,000**

A nice compact summary of this large data set!


Histogram
Frequency
300
250
200
150
100
50
0
1
11
51
110
206
250
214
100
48
9
0
1
2
3
4
5
6
7
8
9
x

Here is a data set consisting of 1,000 values from 36 to 92.

62	56	54	58	66	58	64	53	63	69
74	58	59	55	61	63	71	54	64	54
63	39	61	44	61	50	52	62	45	63
63	56	58	67	76	57	55	58	65	49
76	63	61	60	60	70	60	55	79	48
63	50	55	57	76	57	73	47	58	62
49	71	56	59	70	45	57	60	68	73
52	60	60	80	66	51	62	68	54	58
61	58	64	67	66	61	51	63	52	57
71	60	62	53	60	68	57	57	62	55
64	46	54	63	64	66	65	49	56	72
69	63	63	67	72	64	51	68	63	40
62	57	69	68	49	65	66	71	53	68
59	56	52	61	54	58	61	63	76	75
65	64	51	61	63	57	58	66	63	46
73	69	54	57	51	51	54	60	59	52
59	53	49	56	54	57	64	68	64	64
61	64	57	62	57	56	65	51	58	50
59	56	68	65	71	56	63	71	58	59
65	63	64	63	58	66	74	53	71	76
55	73	65	67	59	52	52	62	55	70
60	64	77	58	57	58	63	68	54	64
69	57	61	62	58	57	51	62	66	52
61	67	69	73	54	70	51	71	45	54
69	54	57	65	67	67	69	70	55	46
67	52	62	60	47	62	51	68	67	55

71	76	56	53	63	60	57	41	64	66
59	62	64	53	54	64	52	73	73	62
68	58	58	70	68	74	65	43	65	52
81	57	57	58	54	64	72	71	58	66
56	64	62	68	48	53	41	56	68	73
60	49	56	55	70	53	59	61	71	60
44	79	64	60	56	67	45	57	50	58
54	54	46	69	59	51	66	53	58	64
65	59	55	60	53	58	85	59	60	70
67	58	79	64	61	68	57	53	45	56
67	57	69	40	71	61	74	61	63	56
57	59	63	49	66	53	57	51	47	50
57	56	65	63	65	71	60	70	64	60
51	69	53	53	71	54	65	48	47	62
81	58	55	73	65	59	65	70	65	58
65	69	49	53	60	59	56	60	55	53
56	58	61	67	59	68	64	59	66	58
63	61	58	66	62	67	66	59	75	54
55	55	71	47	58	70	48	57	49	55
52	55	60	53	68	63	51	64	64	77
54	70	67	49	59	52	57	69	92	65
78	74	54	67	55	57	69	59	55	58
52	73	60	69	47	55	64	61	53	60
48	54	59	54	62	63	68	57	72	71
43	58	58	70	57	50	53	63	61	69
68	61	53	60	60	59	81	63	51	53
42	47	49	64	68	60	68	71	55	41
59	56	52	54	50	54	60	69	61	50
70	55	56	48	64	70	53	51	54	56
62	70	67	57	68	56	60	54	60	71

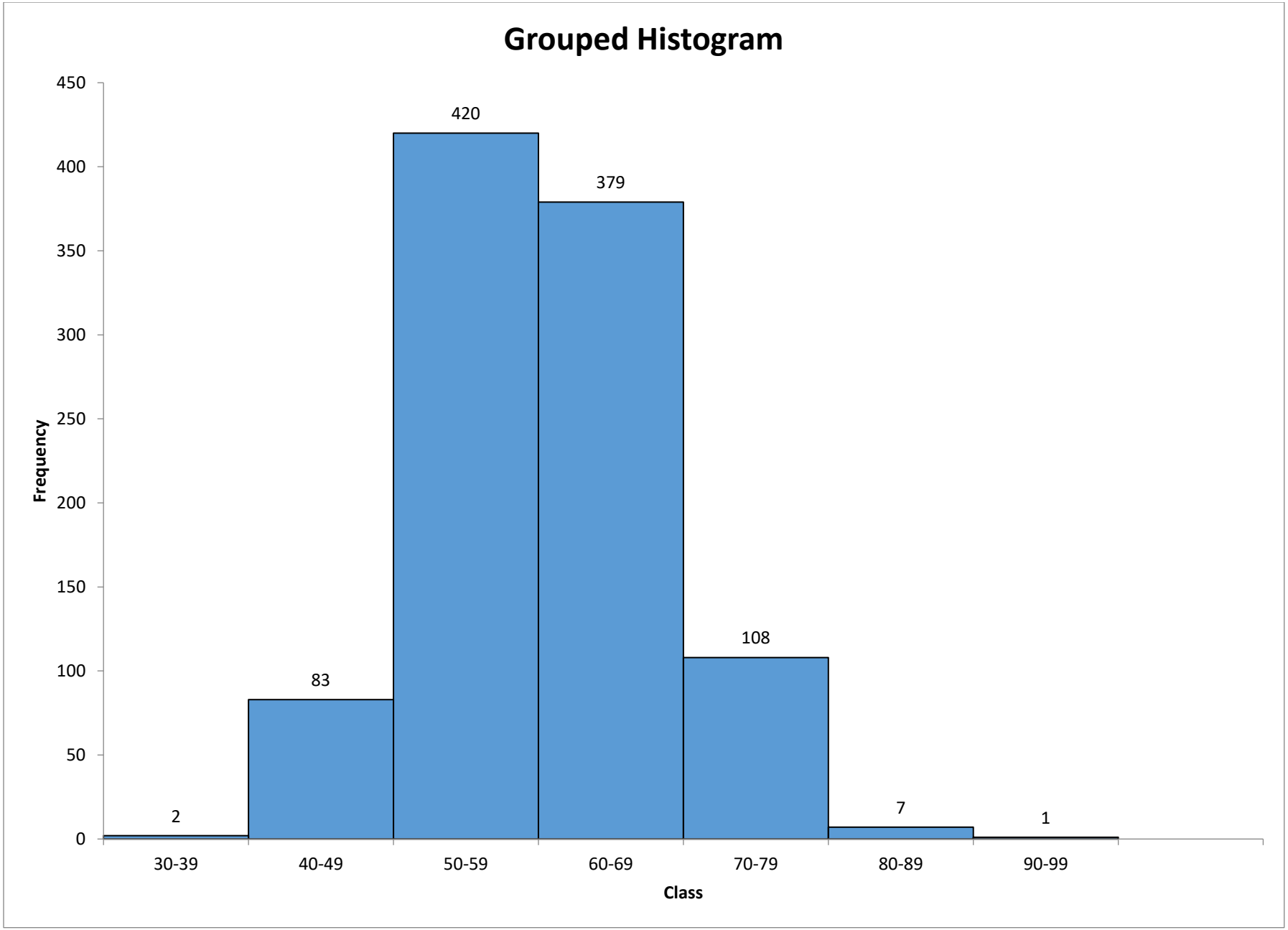
59	61	60	54	62	71	56	79	59	55
49	50	63	59	47	64	53	62	56	50
68	58	72	60	55	50	57	59	54	68
65	44	57	61	79	58	54	66	72	65
69	57	62	57	72	61	58	56	61	36
59	52	58	68	50	57	63	48	83	57
46	53	69	65	59	45	61	72	61	71
50	58	64	63	64	62	66	72	62	53
62	50	73	72	58	51	59	66	52	47
62	49	72	57	65	66	55	67	52	53
54	63	59	61	60	49	52	59	60	61
65	59	66	68	59	53	70	66	56	49
62	56	58	66	51	58	83	69	49	54
72	52	59	55	56	70	62	60	70	57
58	56	53	54	60	74	62	64	60	63
64	53	62	56	56	72	53	66	60	57
63	60	59	67	52	69	53	53	49	66
76	64	58	63	51	63	44	69	74	61
54	51	67	44	56	66	56	53	54	66
58	46	54	61	53	62	50	58	55	59
55	51	55	52	65	61	58	60	69	55
65	66	72	56	58	63	49	47	69	54
64	69	54	68	60	71	58	66	53	59
72	69	51	62	55	45	47	59	69	61
65	61	56	59	64	65	64	56	60	61
69	79	54	74	65	62	64	51	58	55
46	54	54	67	66	45	53	70	51	69
47	53	70	63	66	42	47	47	62	51
64	53	57	60	69	56	61	54	57	51
54	48	65	57	57	61	62	59	70	73

69	46	56	52	64	65	52	63	63	57
60	65	59	58	52	51	50	64	53	44
59	68	59	54	63	49	62	64	52	53
65	53	47	57	52	48	59	61	61	40
60	73	54	60	70	49	47	60	55	53
51	52	60	63	59	51	52	69	58	52
54	63	69	51	74	54	57	54	59	62
76	61	70	70	51	70	65	73	53	60
61	55	70	57	52	59	53	51	58	68
40	53	64	50	69	48	59	56	58	68
56	61	54	60	56	55	58	41	63	63
58	66	54	62	53	55	49	53	48	59
61	59	72	54	50	49	65	50	57	78
68	60	51	69	53	62	63	56	53	74

Excel can automatically construct a grouped frequency distribution and histogram for this large data set.

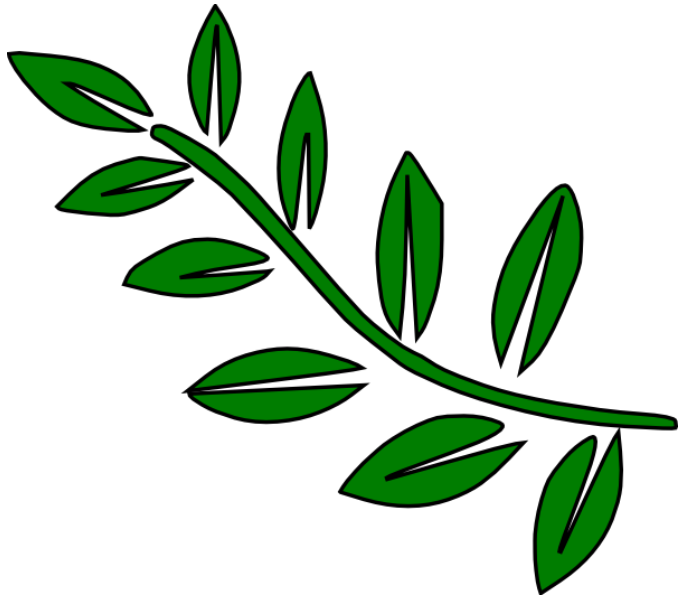
Class	*Frequency*
30-39	**2**
40-49	**83**
50-59	**420**
60-69	**379**
70-79	**108**
80-89	**7**
90-99	**1**
Total	**1,000**

A nice compact summary of this large data set!


Grouped Histogram
450
400
350
300
250
200
150
100
50
0
Frequency
420
379
108
83
7
2
1
30-39
40-49
50-59
60-69
70-79
80-89
90-99
Class

Stem and Leaf Plot:

The actual data values themselves are used to create a frequency distribution of the data set.



Data Set: $\{10, 22, 31, 11, 22, 36, 46, 45, 50, 42\}$

1	0	1	
2	2	2	
3	1	6	
4	6	5	2
5	0		

Allows easy visual determination of the most and least frequently occurring decades!

Ordered Stem and Leaf Plot:

1	0	1	
2	2	2	
3	1	6	
4	6	5	2
5	0		

The leaves are listed in ascending order.

1	0	1	
2	2	2	
3	1	6	
4	2	5	6
5	0		

Allows easy visual determination of the smallest and largest values!

Example:

3	2	3	5	8
4	0	3	9	
5	1	1		
6	2	2	7	
7	0	0	0	5

How many values are in the data set? 16

What's the smallest value? 32

What's the largest value? 75

What's the most frequently occurring value? 70

How many values are in the 60's? 3

Which decade has the fewest values? 50's

Split Stem-and-Leaf Plots:

Sometimes the stems are split into two with the first stem getting the digits 0-4 and the second stem getting the digits 5-9. Instead of a histogram with class widths of 10, the class widths are 5.

3	2	3	
3	5	8	
4	0	3	
4	9		
5	1	1	
5			
6	2	2	
6	7		
7	0	0	0
7	5		

Which range of 5 contains the most values? 70-74

Which range of 5 contains the fewest values? 55-59

Back-to-Back Stem-and-Leaf Plots:

Used to compare two data sets.

Data Set A	Data Set B
	1 | 6 8
	2 | 1 4 5 6 7 7
7	3 | 0 5 9 9 9
2	4 | 1 3 4 6 7 8
7 4 2 1	5 | 5
6 5 5 5 4 3 2	6 | 2
7 7 6 6 5 4 3 1	7 |
9 9 8 8 8 7 7 3 2 2 0	8 |
6 5 4 2 1 0 0	9 |

The values of which data set are generally larger? Data Set A

Which data set has more values?

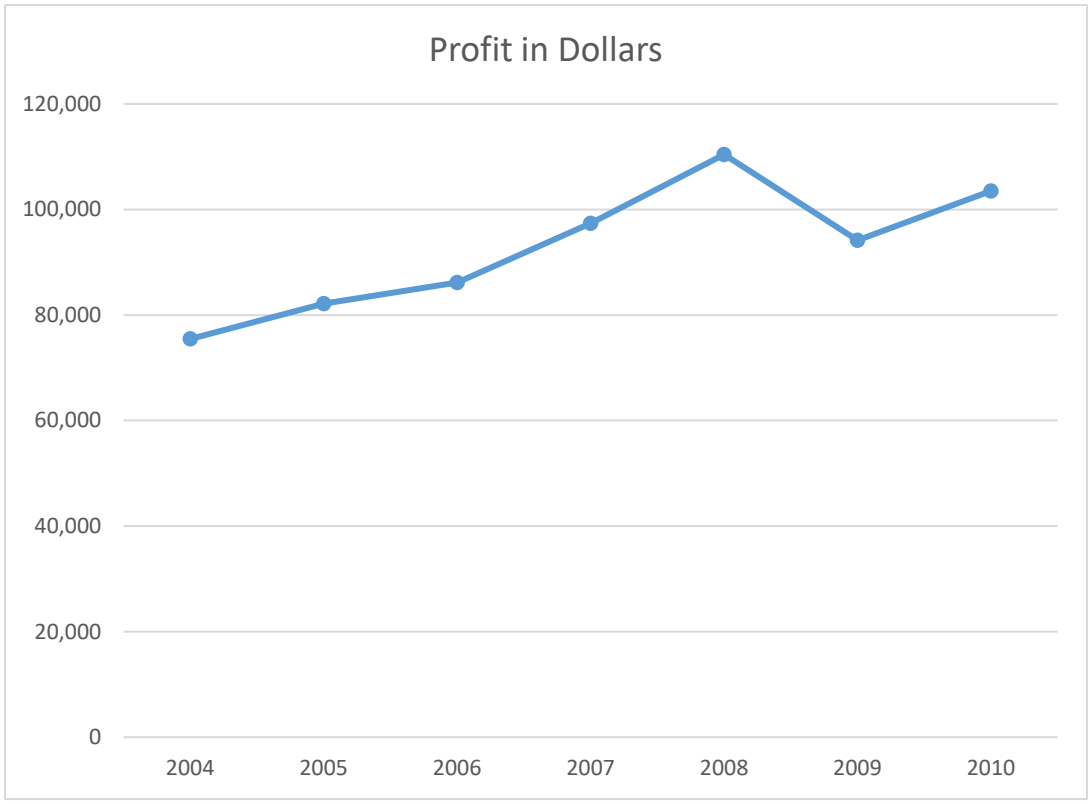
Data Set A

What value is common to both data sets?

62

Line Graph:

Plots data over time to indicate trends(up or down).



Year	Profit in Dollars
2004	75,465
2005	82,160
2006	86,187
2007	97,355
2008	110,423
2009	94,191
2010	103,505

Trends are more easily detected visually.