

Frequency Distribution

Course: Statistics 1

Lecturer: Dr. Courtney Pindling



Frequency Distribution

- A **frequency distribution** is a summary of data showing the number (**frequency**) of items in each of several *nonoverlapping classes*
 - A **class** is a defined range of values that do not overlap, e.g. *30 to 39 and 40 to 49*
- A frequency distribution can be illustrated either:
 - With tables – **tabular** form
 - With graphs – **graphic** form

Classes

- Recommend between 5 to 20 classes
- **Class Width**
 - Approx. Class width = $(\text{Maximum} - \text{Minimum}) / \text{No. Class}$
- **Class Limits** must be chosen so that data item belongs to *one and only one* class (no overlap)
- **Class Midpoint** is the value halfway between maximum and minimum values or *upper and lower class limits*
 - Class Midpoint, **CM** = $(\text{Maximum} + \text{Minimum}) / 2$

Example Data Set

48	49	61	50	47	53	43	50	49	55
60	66	48	47	58	47	57	52	52	55
54	57	46	54	43	58	51	48	58	54
38	47	52	50	44	40	57	54	54	53
46	56	56	43	50	59	52	60	66	44
51	45	50	45	48	59	45	50	54	51
58	47	44	64	55	51	59	64	47	54
60	54	51	66	57	55	60	56	56	63
65	65	62	44	65	60	61	44	46	54
44	56	55	47	60	48	50	48	44	57

Confidence Index: From 38 to 66

Frequency Distribution

Simple Frequency Table

- Simple frequency distribution table
- Shows frequencies of each value in data set

selfconf					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	38.00	1	1.0	1.0	1.0
	40.00	1	1.0	1.0	2.0
	43.00	3	3.0	3.0	5.0
	44.00	7	7.0	7.0	12.0
	45.00	3	3.0	3.0	15.0
	46.00	3	3.0	3.0	18.0
	47.00	7	7.0	7.0	25.0
	48.00	6	6.0	6.0	31.0
	49.00	2	2.0	2.0	33.0
	50.00	7	7.0	7.0	40.0
	51.00	5	5.0	5.0	45.0
	52.00	4	4.0	4.0	49.0
	53.00	2	2.0	2.0	51.0
	54.00	9	9.0	9.0	60.0
	55.00	5	5.0	5.0	65.0
	56.00	5	5.0	5.0	70.0
	57.00	5	5.0	5.0	75.0
	58.00	4	4.0	4.0	79.0
	59.00	3	3.0	3.0	82.0
	60.00	6	6.0	6.0	88.0
	61.00	2	2.0	2.0	90.0
	62.00	1	1.0	1.0	91.0
	63.00	1	1.0	1.0	92.0
	64.00	2	2.0	2.0	94.0
	65.00	3	3.0	3.0	97.0
	66.00	3	3.0	3.0	100.0
	Total	100	100.0	100.0	

Frequency Distribution

Grouped Frequency Table

- Grouped Frequency Distribution table
- Shows frequencies of each class
- Define class width to have equal intervals
 - Approximate class width:
$$CW = (Max - Min) / No. Class$$

Class	Frequency (f)
30 – 39	1
40 – 49	32
50 – 59	49
60 – 69	18
Total	100

Frequency Distribution - Class

- **Class Width is 10**
 - 30, 31, 32, 33, 34, 35, 36, 37, 38, 39
- **Class Midpoints** are shown
 - 30-39 Class is 35
- **Class Limits**
 - *30-39 Class:*
Lower Limit is 30
Upper Limit is 39

Class	Frequency (f)	Midpoint
30 – 39	1	34.5
40 – 49	32	44.5
50 – 59	49	54.5
60 – 69	18	64.5
Total	100	

Relative and Percent Frequency

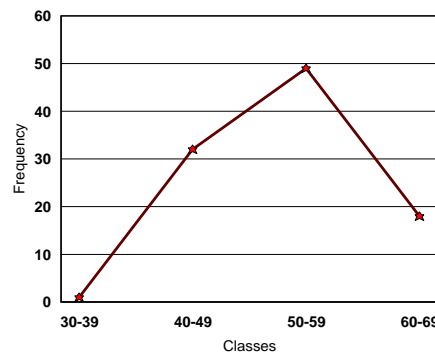
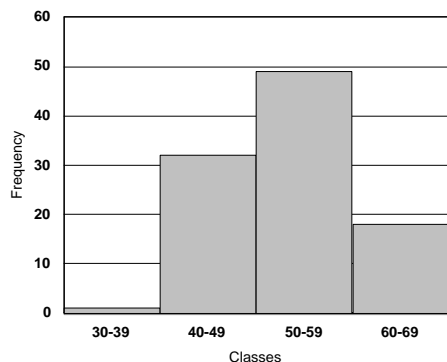
Class	Frequency (f)	Relative Frequency	Percent Frequency
30 – 39	1	0.01	1
40 – 49	32	0.32	32
50 – 59	49	0.49	49
60 – 69	18	0.18	18
Total	100		

$$\text{Relative frequency of class} = \frac{\text{Frequency of the class}}{\text{Total Number of Observations}}$$

Frequency Distribution – Graphics

- Frequency Table
- Frequency Graphs
 - Frequency Histogram
 - Frequency Polygon
 - Stem-and-leaf Diagram

Class	Frequency (f)
30 – 39	1
40 – 49	32
50 – 59	49
60 – 69	18
Total	100

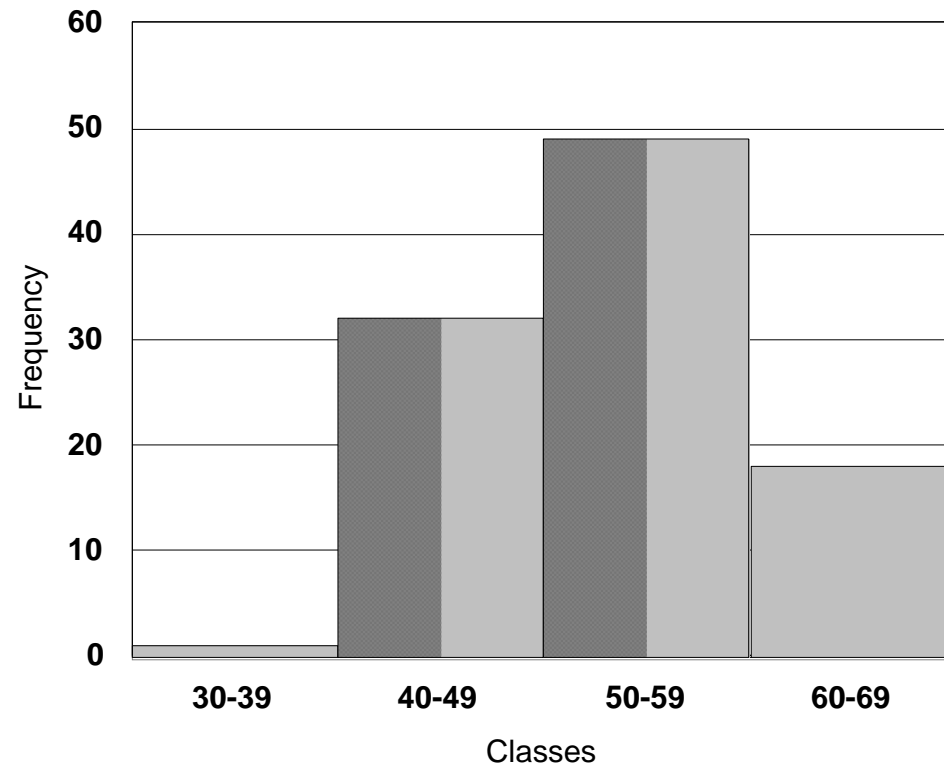


Frequency Stem & Leaf

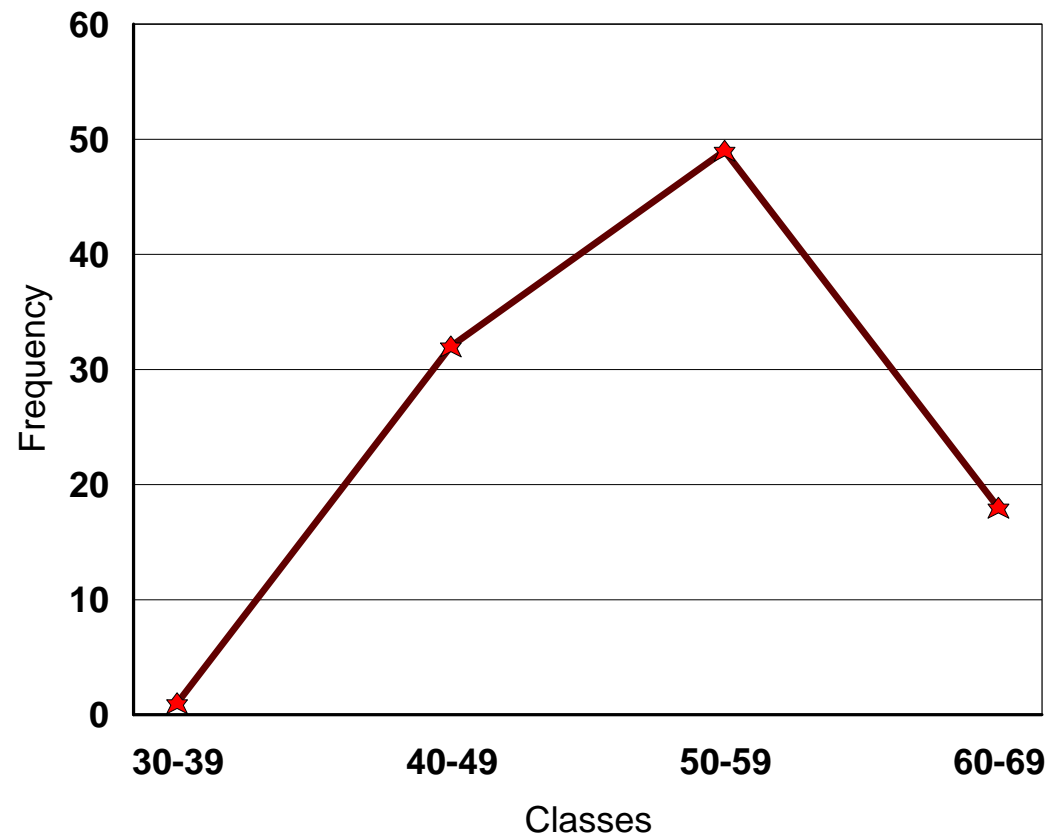
```

.00  3 .
1.00  3 . 8
1.00  4 . 0
3.00  4 . 333
10.00  4 . 4444444555
10.00  4 . 6667777777
8.00  4 . 88888899
12.00  5 . 000000011111
6.00  5 . 222233
14.00  5 . 444444444455555
10.00  5 . 66666777777
7.00  5 . 8888999
8.00  6 . 00000011
2.00  6 . 23
5.00  6 . 44555
3.00  6 . 666
    
```

Frequency Histogram - Grouped



Frequency Polygon - Grouped



Frequency Stem-and-leaf

- Easy to construct by hand
- Provides more information about data distribution than histogram
 - *Shows the actual data values*

Frequency	Stem & Leaf
.00	3 .
1.00	3 . 8
1.00	4 . 0
3.00	4 . 333
10.00	4 . 444444555
10.00	4 . 6667777777
8.00	4 . 88888899
12.00	5 . 00000011111
6.00	5 . 222233
14.00	5 . 4444444455555
10.00	5 . 6666677777
7.00	5 . 8888999
8.00	6 . 0000011
2.00	6 . 23
5.00	6 . 44555
3.00	6 . 666