

## Lecture No. 2

# Introduction to Statistics Statistics and Probability

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# Descriptive Statistics

## Tabular and Graphical

## Presentation of Data

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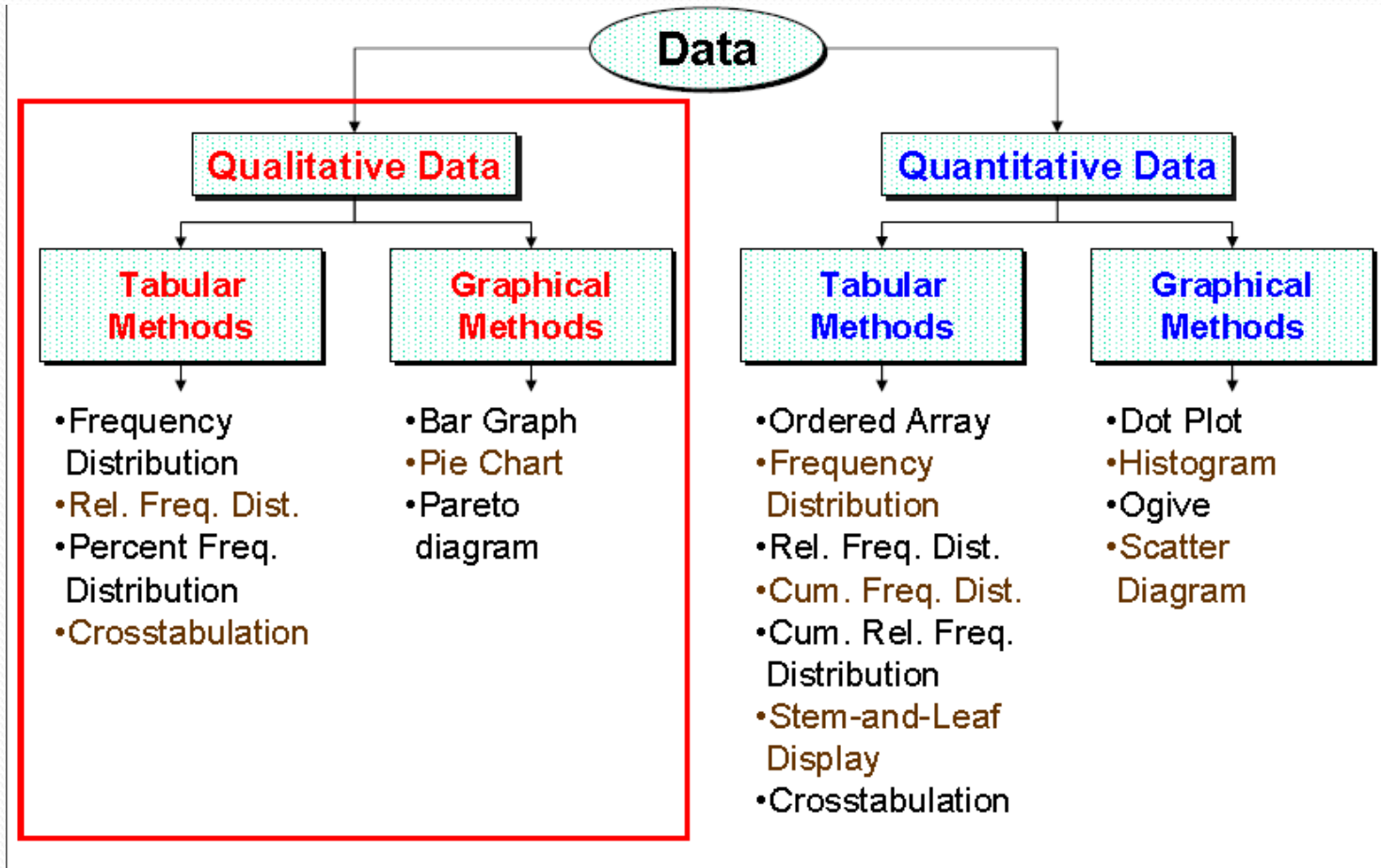
# In this lecture

- Overview of Tabular and Graphical Procedures
- Charts or Diagrams
- Single and Multiple Bar Charts
- Component and Percentage Component Bar Charts
- Pie, Pareto, Dot Plots
- Stem & Leaf Diagram
- Scatter Diagram

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# Overview of Tabular and Graphical Procedures



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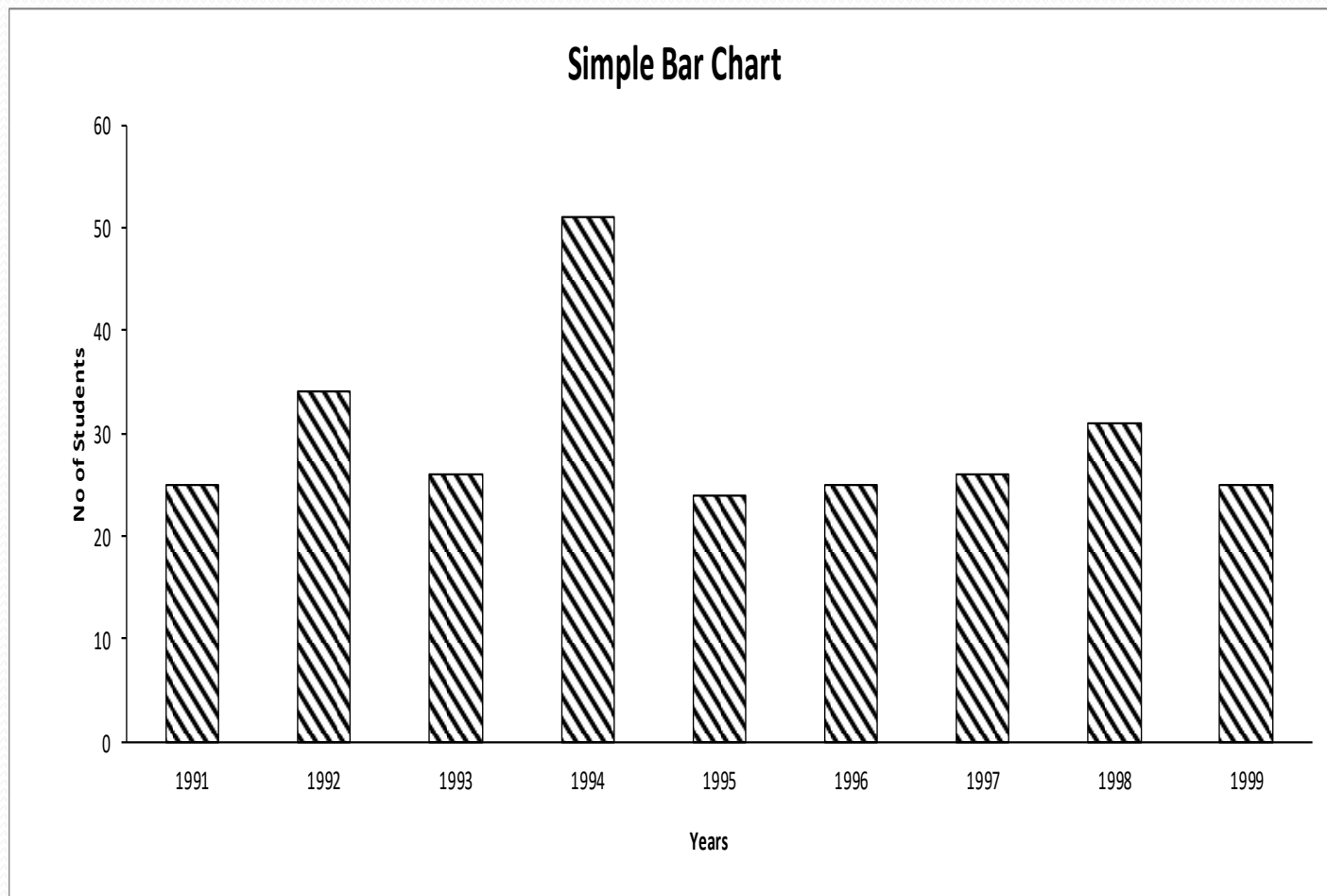
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# Charts or Diagrams

- Bar Chart
- Multiple Bar Chart
- Component Bar Chart
- Percentage Component Bar Chart
- Pie Chart
- Pareto Chart
- Dot Plot Chart
- Stem and Leaf Chart
- Scatter Diagram

# Bar Chart

Years	Lahore
1991	25
1992	34
1993	26
1994	51
1995	24
1996	25
1997	26
1998	31
1999	25

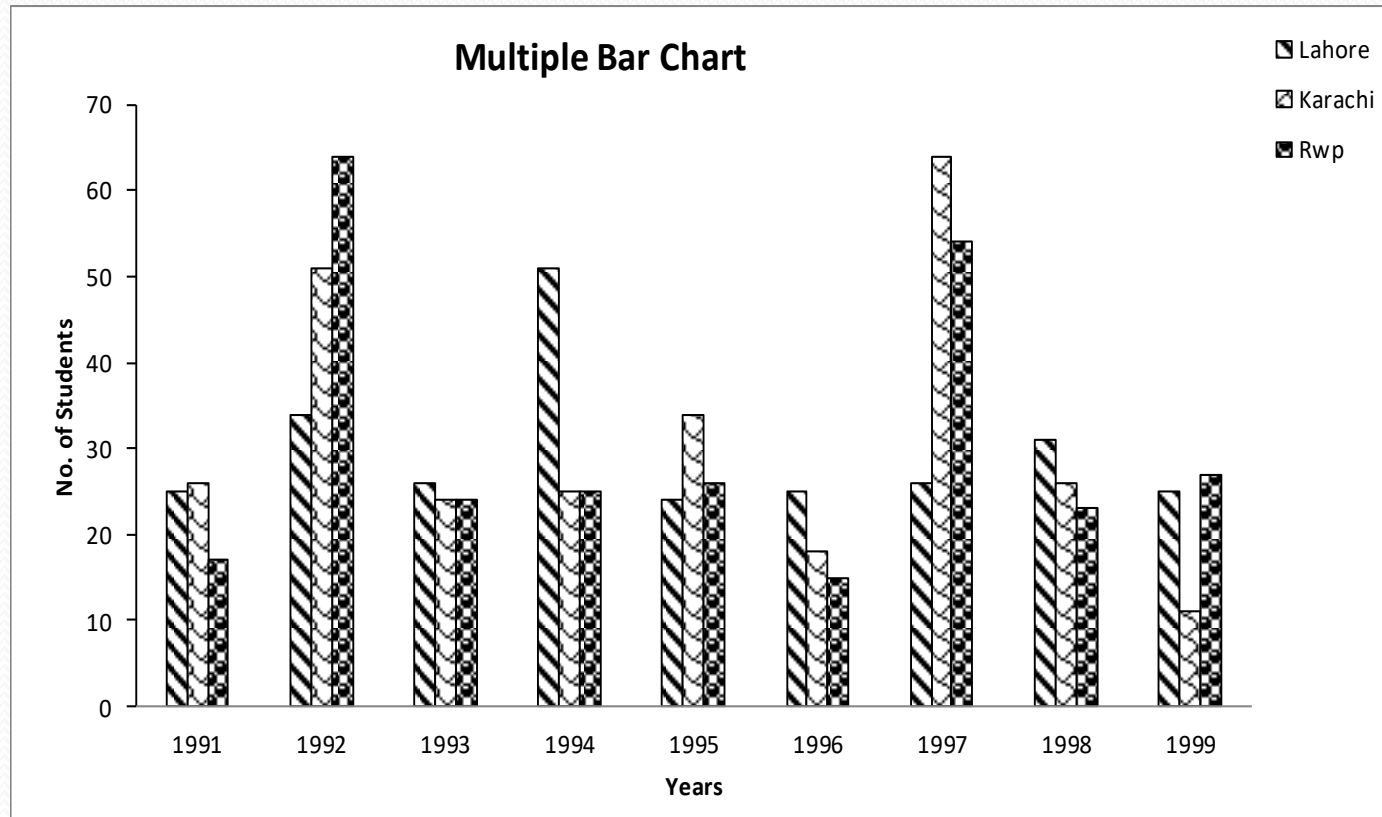


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# Multiple Bar Chart

Years	Lahore	Karachi	Rwp
1991	25	26	17
1992	34	51	64
1993	26	24	24
1994	51	25	25
1995	24	34	26
1996	25	18	15
1997	26	64	54
1998	31	26	23
1999	25	11	27

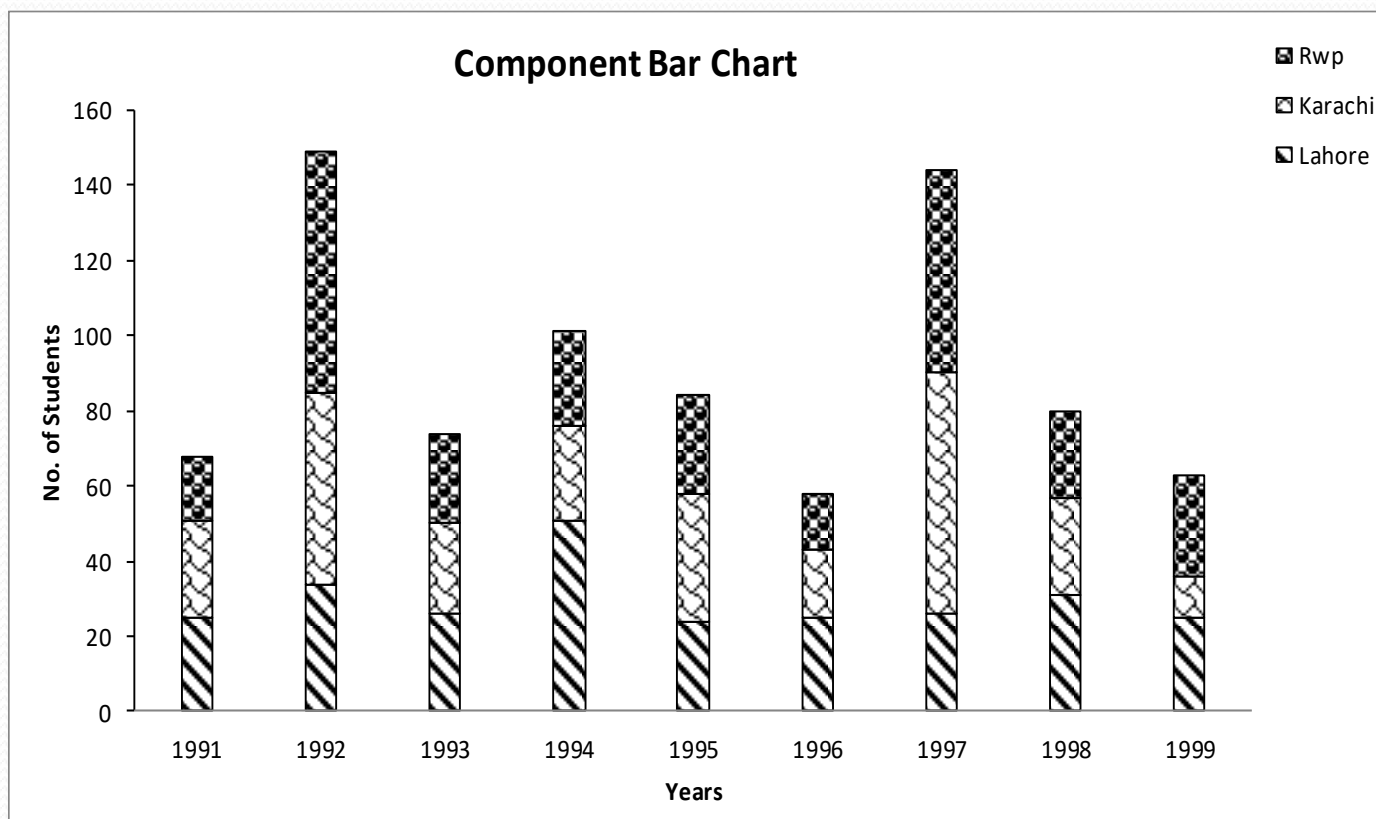


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# Component Bar Chart

Years	Lahore	Karachi	Rwp
1991	25	26	17
1992	34	51	64
1993	26	24	24
1994	51	25	25
1995	24	34	26
1996	25	18	15
1997	26	64	54
1998	31	26	23
1999	25	11	27



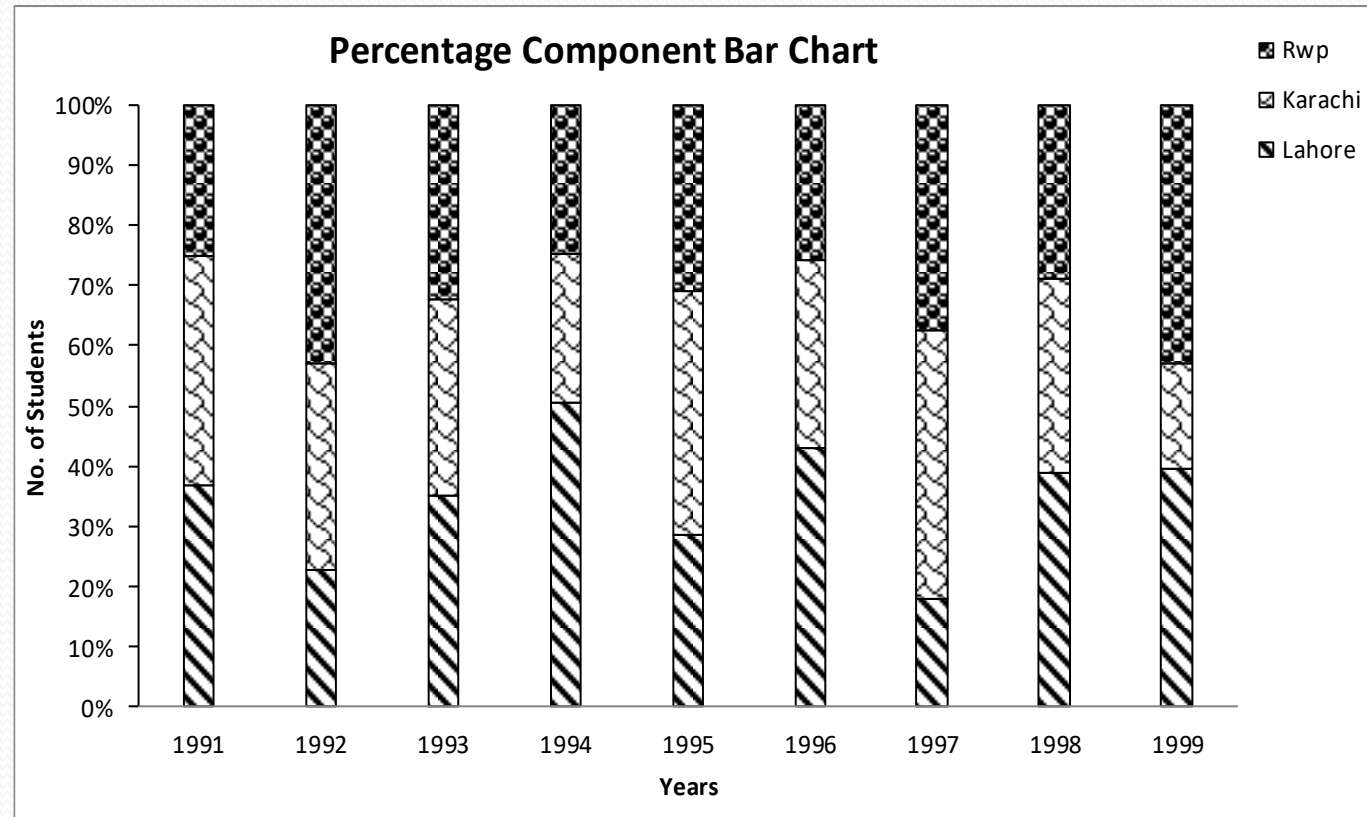
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# Percentage Component Bar Chart

Years	Lahore	Karachi	Rwp
1991	25	26	17
1992	34	51	64
1993	26	24	24
1994	51	25	25
1995	24	34	26
1996	25	18	15
1997	26	64	54
1998	31	26	23
1999	25	11	27



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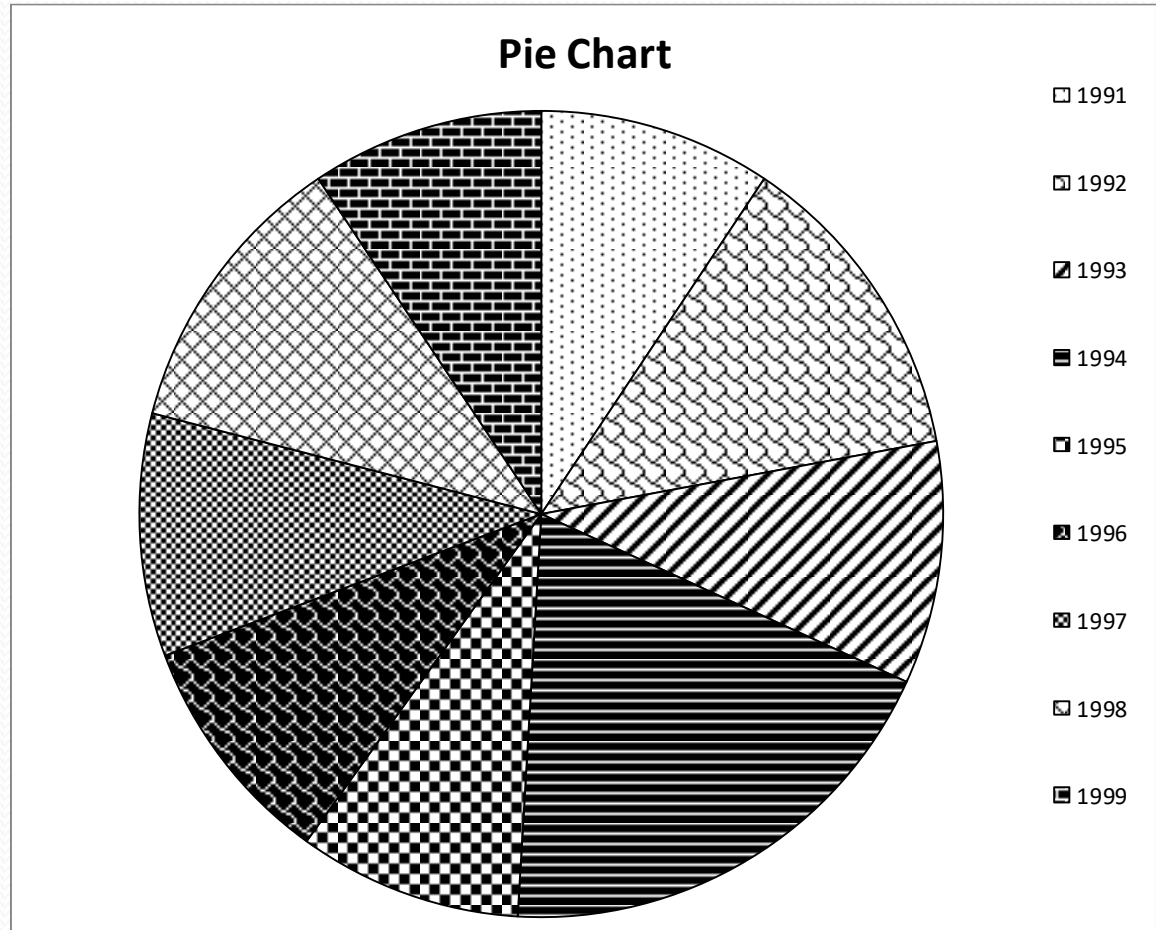
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# Pie Chart

- A commonly used graphical device for presenting relative or percent frequency distributions for qualitative data.
- Procedures
  1. Draw a circle.
  2. Use the relative frequencies to subdivide the circle into sectors that correspond to the relative frequency for each class.
- Since there are 360 degrees in a circle, a class with a relative frequency of .25 would consume  $.25(360) = 90$  degrees of the circle.

# Pie Chart

Years	Lahore
1991	25
1992	34
1993	26
1994	51
1995	24
1996	25
1997	26
1998	31
1999	25



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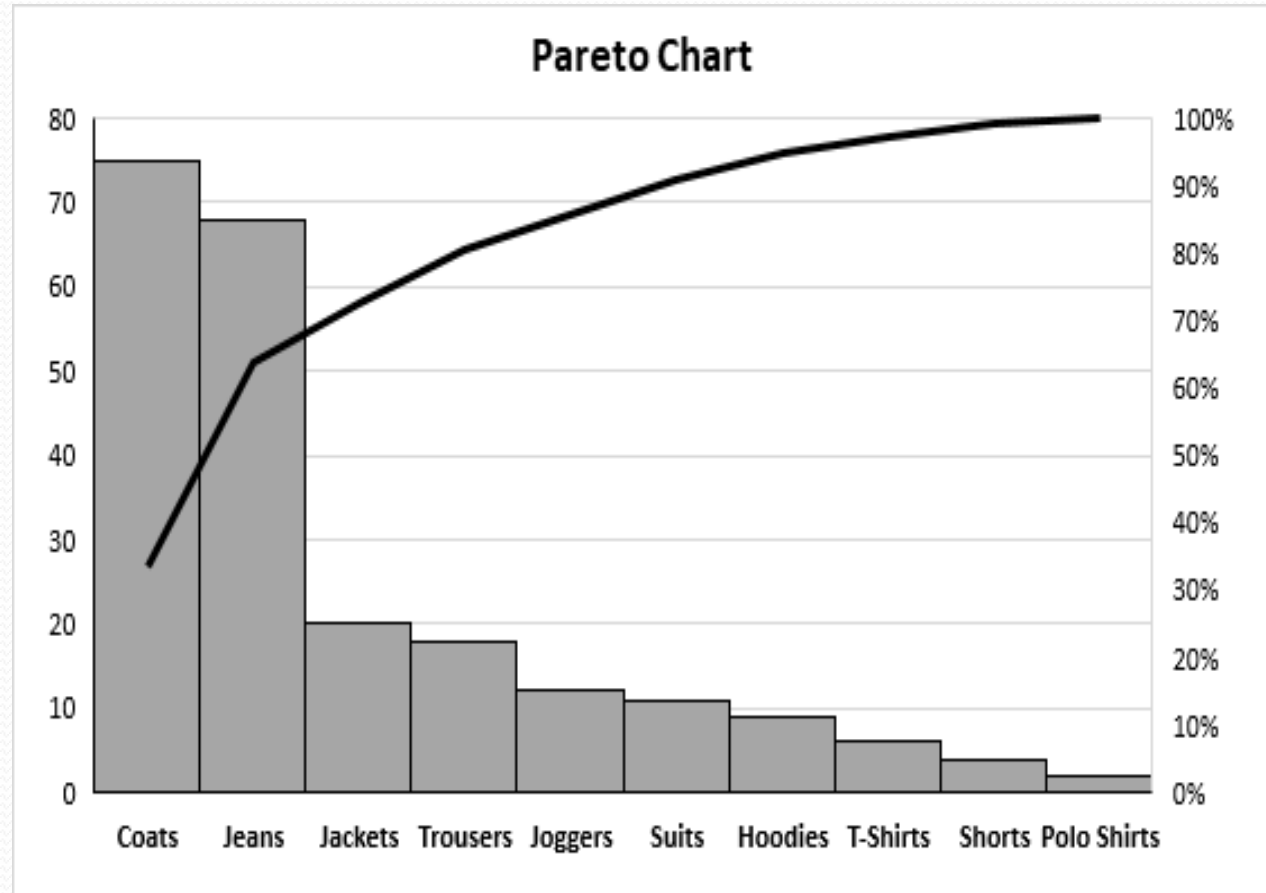
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# Pareto Diagram

- Uses to portray categorical data(nominal scale).
- A bar chart, where categories are shown in descending order of frequency (or relative frequency or percentage).
- Each category represents a cause of a non-conformity or problem for a product.
- A cumulative line chart is often shown in the same graph.
- Uses to separate the “vital few” from the “trivial many” for quality improvement.
- Focuses resources and improvement efforts to a few important factors.

# Pareto Chart

Product	Items Returned
Hoodies	9
Jeans	68
Joggers	12
Polo Shirts	2
Shorts	4
Suits	11
T-Shirts	6
Jackets	20
Trousers	18
Coats	75

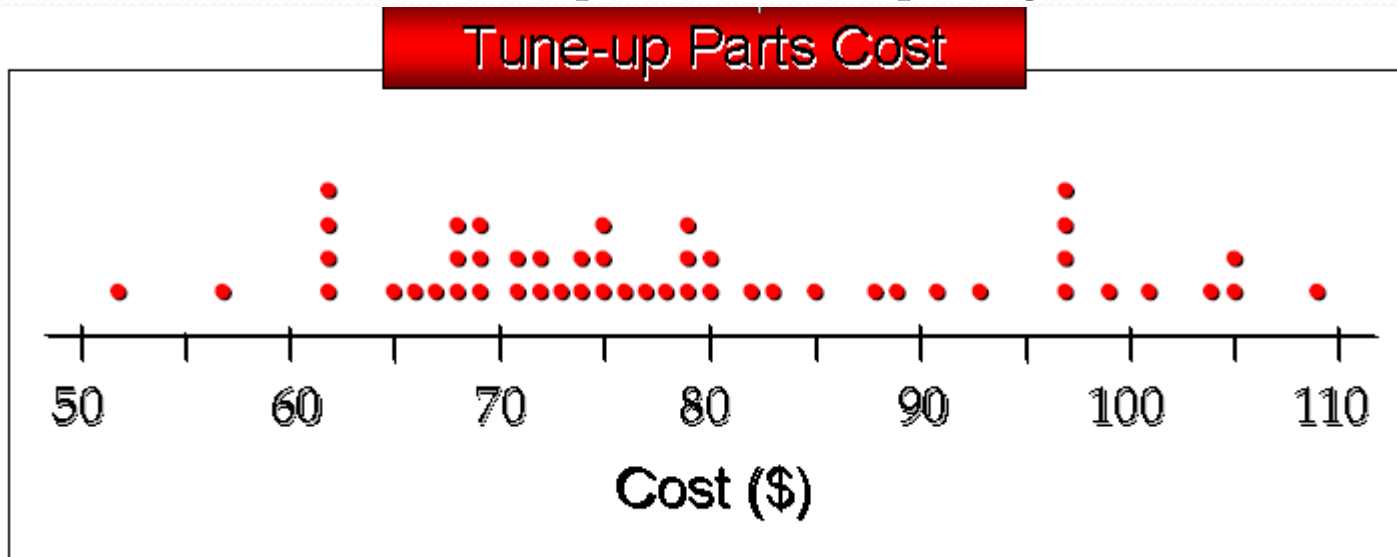


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# Dot Plot (or dot diagram)

- Another simple graphical summary of data.
- X-axis: the range of data values.
- Data value: We place dot(s) above each of the distinct data. The number of dots should be equal to the frequency of that data value.



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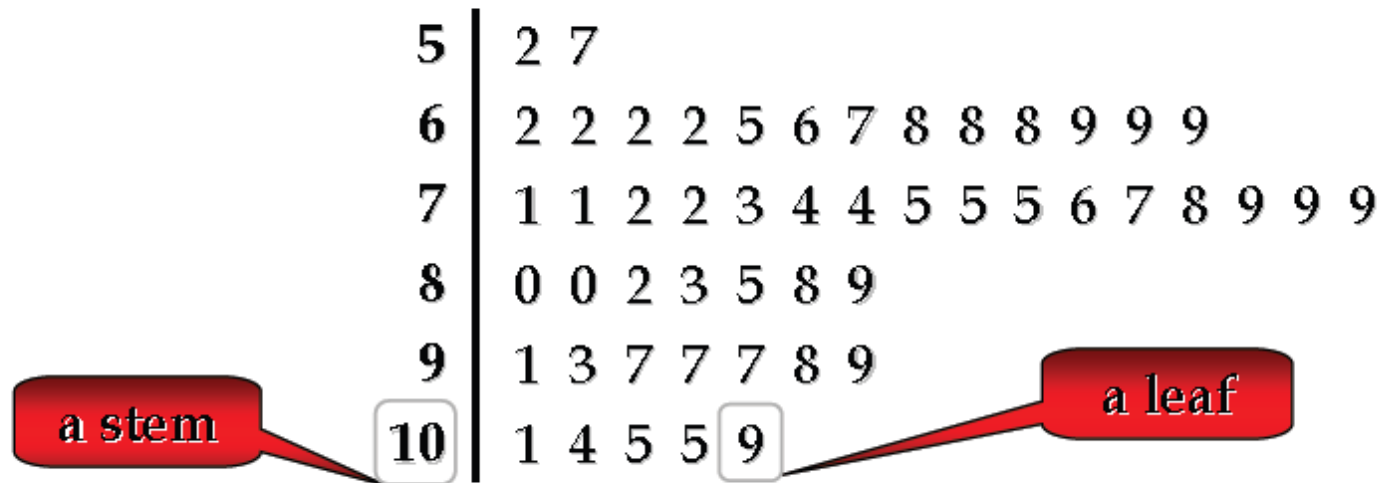
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# Stem and Leaf Diagram

- A stem-and-leaf display shows both the rank order and shape of the distribution of the data.
- It is similar to a histogram on its side, but it has the advantage of showing the actual data values.
- The first digits of each data item are arranged to the left of a vertical line. (Stem values)
- To the right of the vertical line we record the last digit for each item in rank order. (Leaf values)
- Indicate the leaf unit in the plot.

# Stem and Leaf Display

91	78	93	57	75	52	99	80	97	62
71	69	72	89	66	75	79	75	72	76
104	74	62	68	97	105	77	65	80	109
85	97	88	68	83	68	71	69	67	74
62	82	98	101	79	105	79	69	62	73

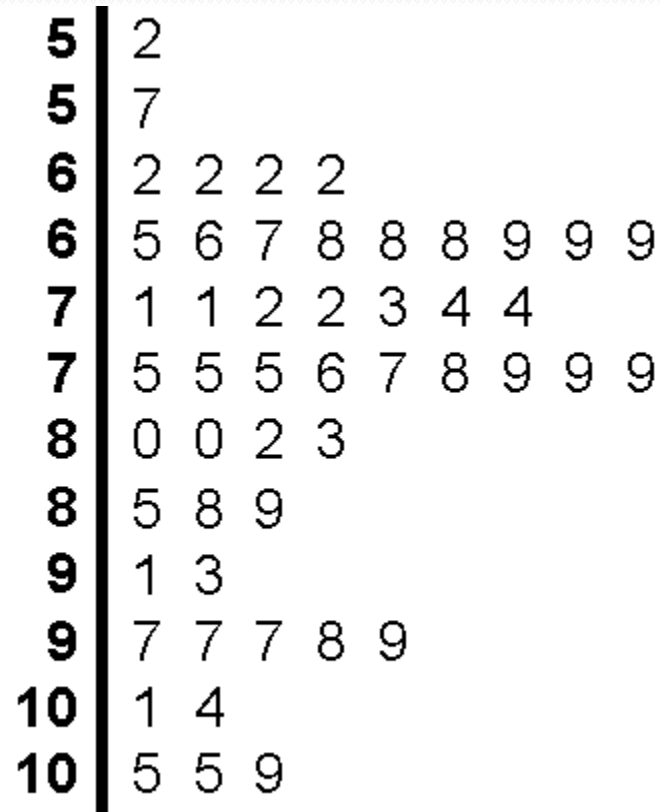




# Stem and Leaf Display

- If we believe the original stem-and-leaf display has condensed the data too much, we can stretch the display by using two stems for each leading digit(s).
- Whenever a stem value is stated twice, the first value corresponds to leaf values of 0 –4, and the second value corresponds to leaf values of 5 –9.

# Stem and Leaf Display



# Stem and Leaf Display

## Leaf Units

- A single digit is used to define each leaf.
- In the preceding example, the leaf unit was 1.
- Leaf units may be 100, 10, 1, 0.1, and so on.
- Where the leaf unit is not shown, it is assumed to equal 1.

# Example: Leaf Unit = 0.1

If we have data with values such as

8.6	11.7	9.4	9.1	10.2	11.0	8.8
-----	------	-----	-----	------	------	-----

The corresponding stem-and-leaf display of these data will be

Leaf Unit = 0.1

8		6 8
9		1 4
10		2
11		0 7

# Example: Leaf Unit = 10

If we have data with values such as

1806 1717 1974 1791 1682 1910 1838

The corresponding stem-and-leaf display of these data will be

Leaf Unit = 10

16		8
17		1 9
18		0 3
19		1 7

The 82 in 1682  
is rounded down  
to 80 and is  
represented as an 8.

# Scatter Diagram

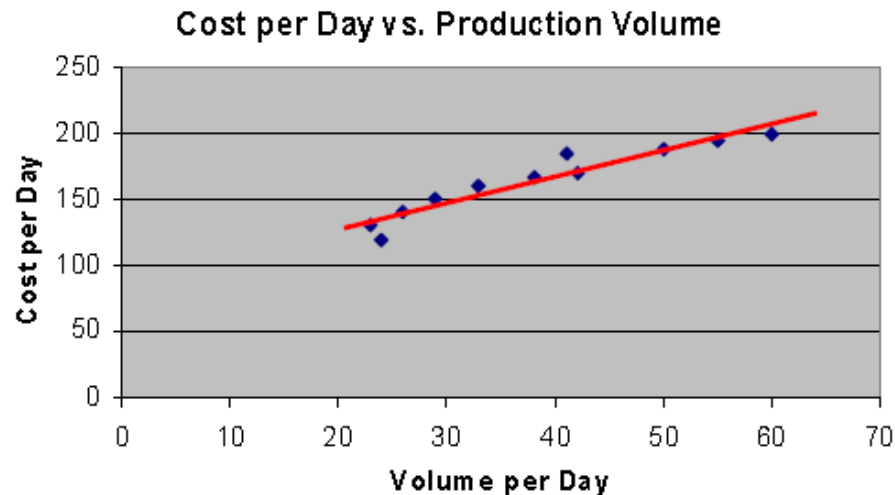
## Scatter Diagram

- Provides an overview of the data.
- Graphical presentation used to examine possible relationships between two numerical variables.
- X-axis: independent variable;
- Y-axis: dependent variable;
- A trend line can be added for an approximation of the relationship.

# Scatter Diagram Example

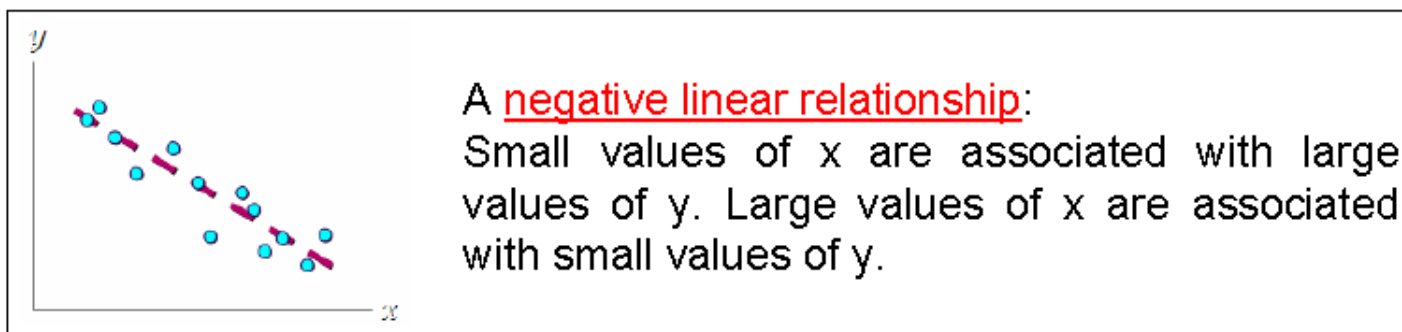
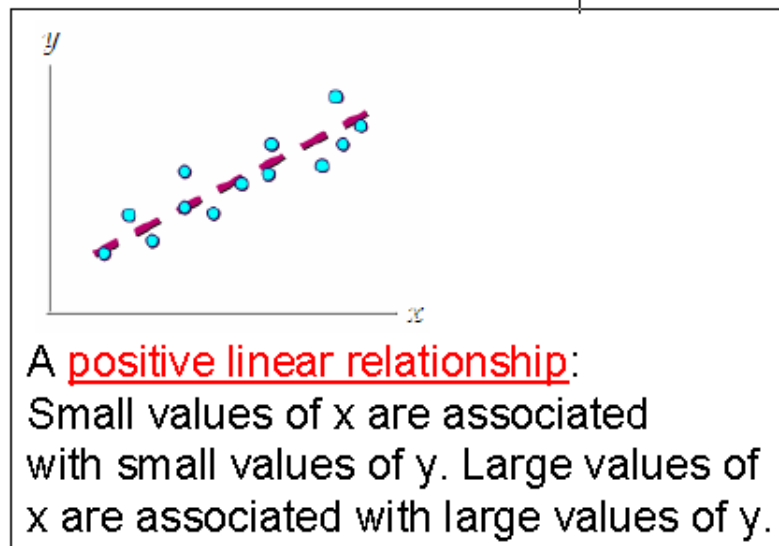
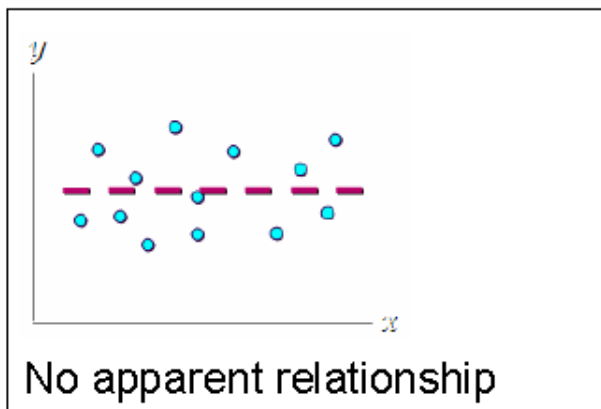
## Scatter Diagram Example

Volume per day	Cost per day
23	131
24	120
26	140
29	151
33	160
38	167
41	185
42	170
50	188
55	195
60	200



A trendline is a line that provides an approximation of the relationship

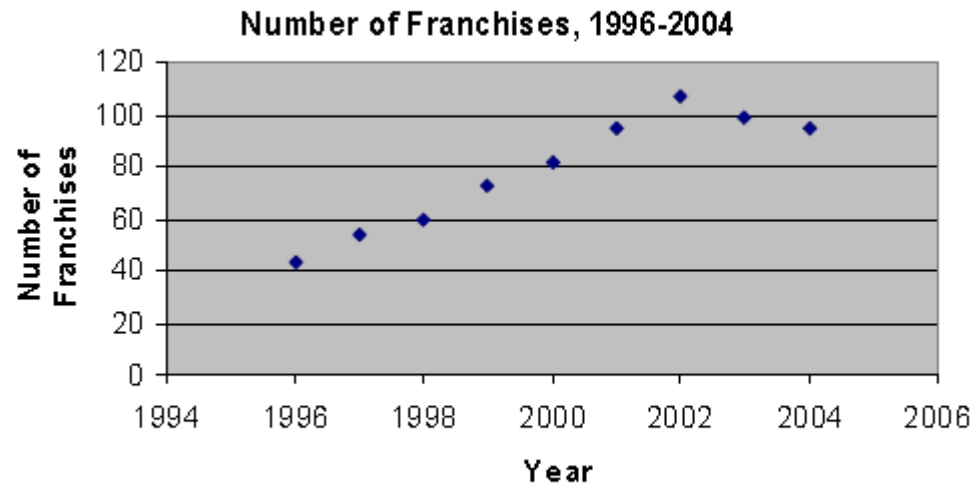
# Scatter Diagram Example





# Scatter Diagram Example

Year	Number of Franchises
1996	43
1997	54
1998	60
1999	73
2000	82
2001	95
2002	107
2003	99
2004	95



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