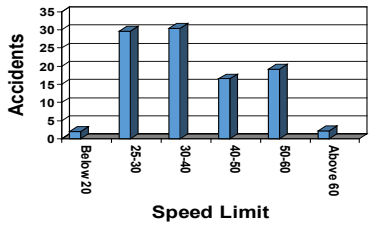
Traffic Safety

Speed	Percentage
25 mph or less	2%
25 to 30 mph	29.70%
30 to 40 mph	30.40%
40 to 50 mph	16.50%
50 to 60 mph	19.20%
above 60 mph	2.20%

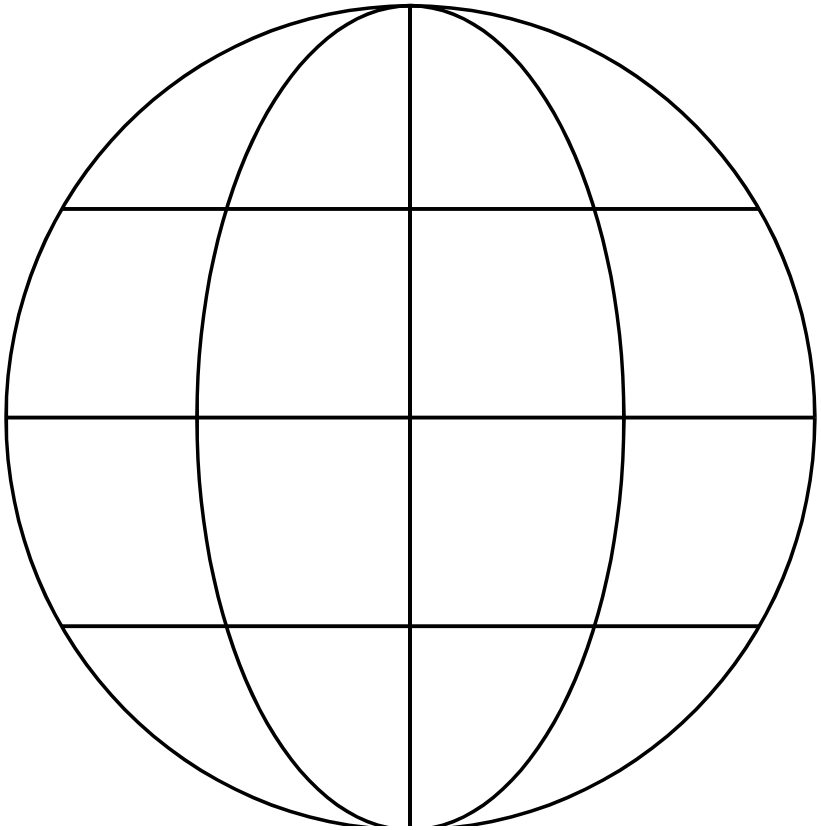


- How does the speed limit affect traffic safety?

Source : Spokesman Review

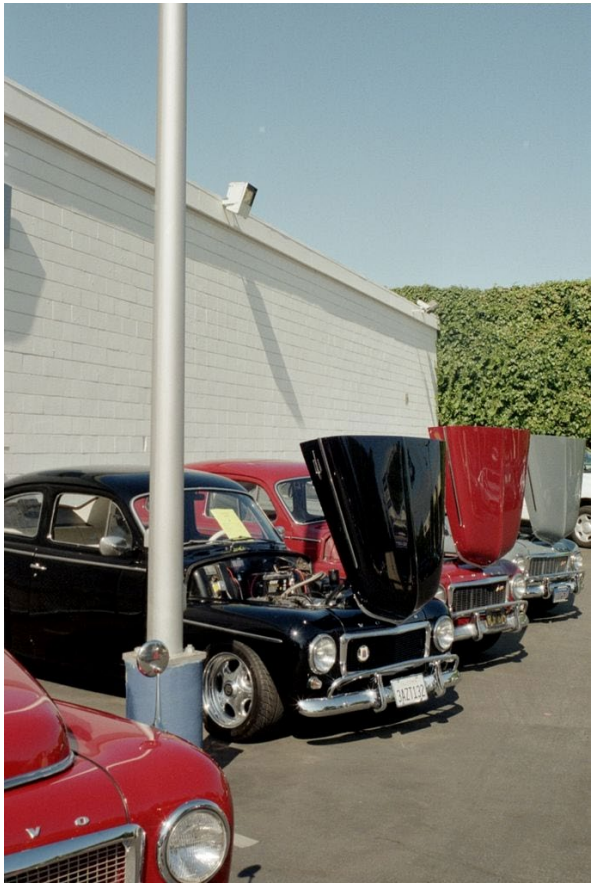
Airplane Safety

- Airlines measure safety in terms of accidents per passenger mile
- Large airplanes are generally found to be safer than small airplanes.



Misleading Commercials

- In a VOLVO commercial the auto manufacturer used the claim that "*95% of all VOLVO's registered here during the past 11 years are still on the road today*" as a measure of their superior durability.
  [Since then, other auto manufacturer's including Chevrolet and Subaru have used similar measures in their commercials]



SOURCE: S. Campbell: Statistics You Can't Trust

Some Basic Terminology

Subject/Case: The object (person or thing) upon which we are collecting data (information)

Population: The collection of all subjects/cases of interest to our study

Sample: The collection of subjects/cases actually used in our study

Variable: A characteristic that varies from subject to subject (case to case)

Label: A special variable used in some data sets to distinguish the different cases

Data: The collection of observed values (observations) for one or more variables recorded for all subjects in the sample.

Distribution: The pattern of variability displayed by the data of a variable. The distribution displays the possible values and the frequency of each value.

Population, Sample, Subjects, Variables, Labels, Data.

- The **height, weight** and **blood pressure** are measured on **20 randomly selected patients** in a hospital.
- Each patient is **assigned a unique patient number.**
- A survey asking **ten different questions** about **how students feel about campus services** is administered to **1000 randomly selected freshmen**.

Two Different Types of Variables

Quantitative Variable: A numerical characteristic that represents a quantity. For this variable is meaningful to:
- Average its values
- Arrange values in order

ex: Age, Length of Employment

Categorical Variable: A non-numerical or numerical characteristic represented by two or more categories (not representing a quantity)

ex: Gender, Ethnicity, Social Security Number

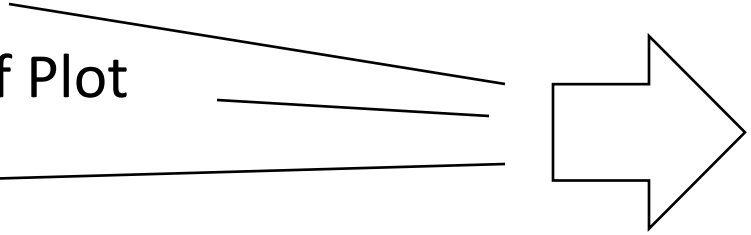
Quantitative or Categorical?

- Number acres in a plot of land.
- Mode of transportation for a city employee.
- Type of residential water heating system.
- Time required for post-operative pain to be relieved after surgery.
- Grades given using A,B,C,D,F.
- Gender (0=male, 1=female).
- Student ID number.
- Age (in years).

Characterizing Data Using Graphical Methods

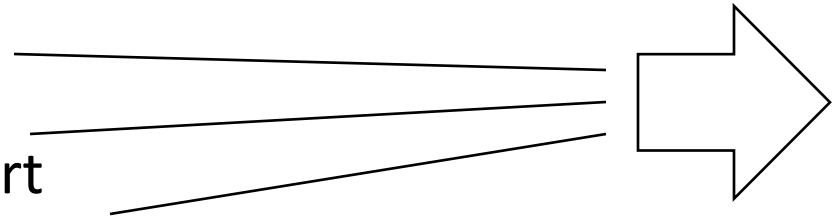
Quantitative Variables

- Histogram
- Stem-and-Leaf Plot
- Time Plot



Categorical Variables

- Pie Chart
- Bar Chart
- Pareto Chart



CASE : Service Visits for Automobiles

- An automobile manufacturer is interested in monitoring the number of service visits for a new automobile brand sold with optional service contract.
- Two samples of 10 cars each were observed during the first and second year.

Automobile Service Data

First Year	3	5	2	6	3	5	4	2	1	3
Second Year	2	1	1	0	1	2	2	3	3	1

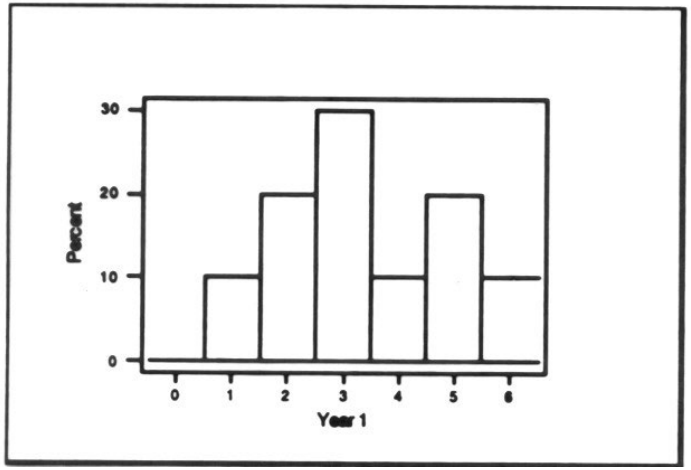
Number of Service Visits

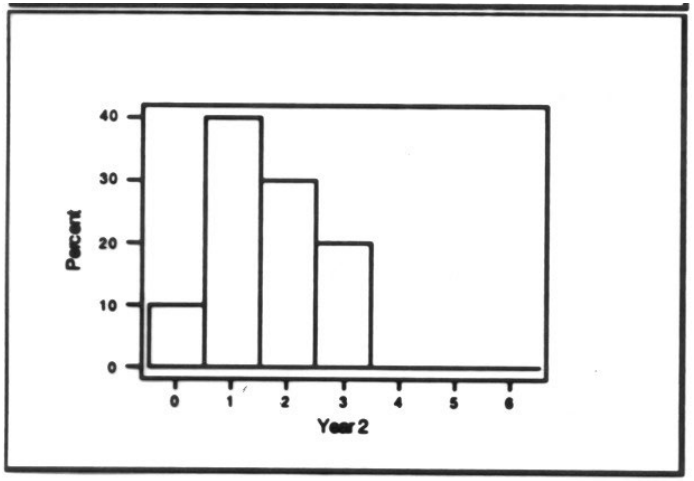
1377	2265	913	1501
982	925	453	85
1505	1265	295	1326
123	1076	829	892
795	992	765	503

Mileage at
First Service Visit

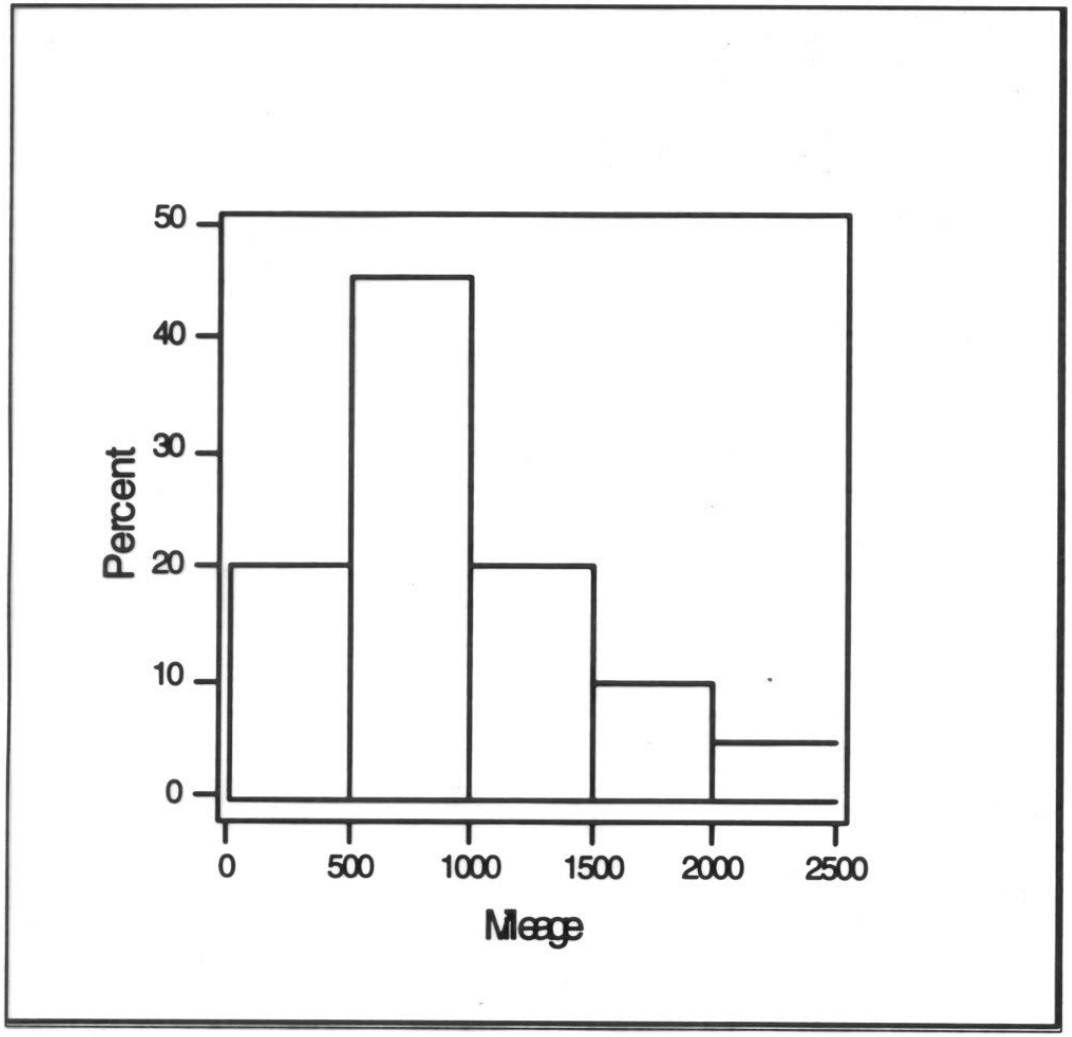
Automobile Service Data

# Service Visits	Frequency		Relative Frequency	
	1st year	2nd year	1st year	2nd year
0	0	1	0	0.1
1	1	4	0.1	0.4
2	2	3	0.2	0.3
3	3	2	0.3	0.2
4	1	0	0.1	0
5	2	0	0.2	0
6	1	0	0.1	0
Total	10	10	1	1





Automobile Service Data

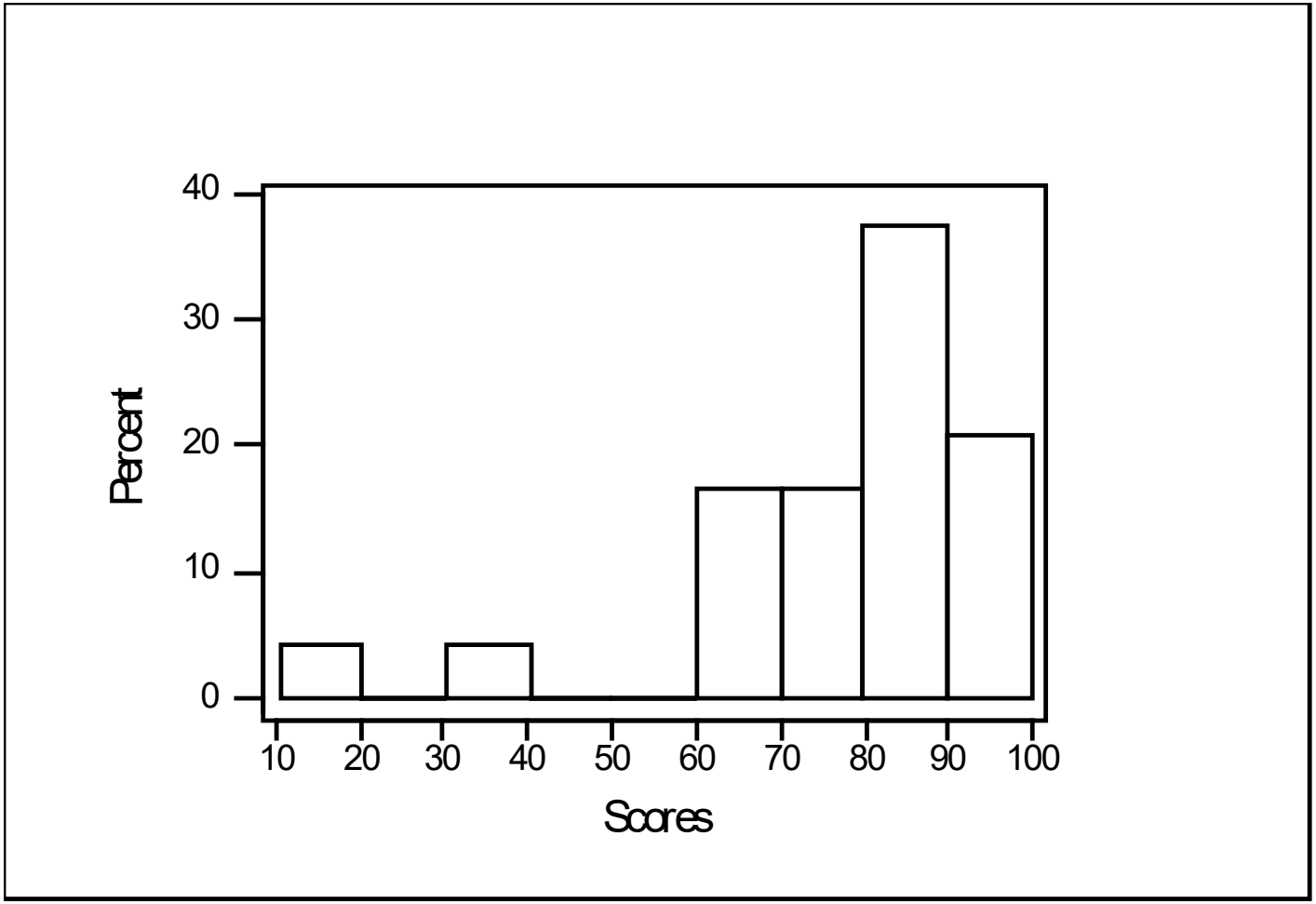


CASE : Statistics Test Scores

- A sample of students obtained the following scores on a statistics tests.

65	13	75	89	92	73	82	85
92	87	95	62	79	82	91	87
65	81	92	86	31	63	74	85

CASE : Statistics Test Scores



Stemplot (Stem and Leaf Plot)

65	13	75	89	92	73	82	85
92	87	95	62	79	82	91	87
65	81	92	86	31	63	74	85

Key

6 | 5 = 65

STEM	LEAF
1	
2	
3	
4	
5	
6	
7	
8	
9	

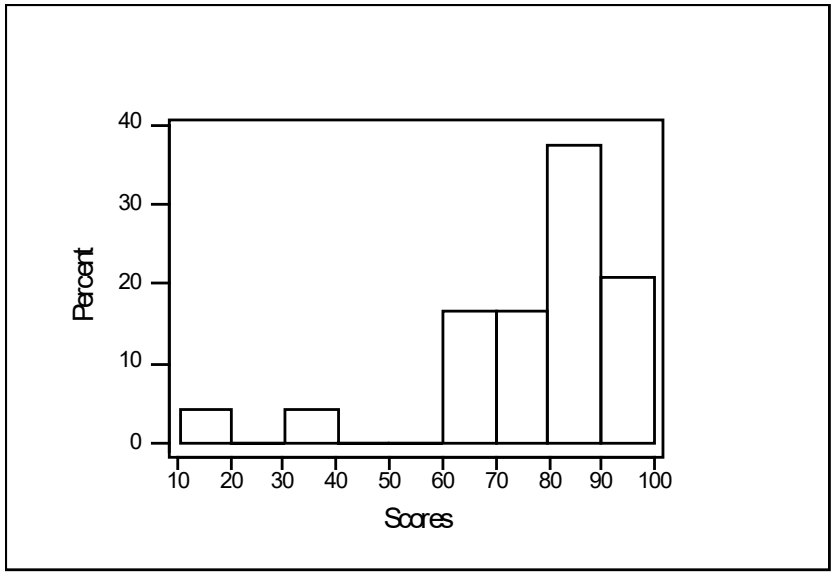
Stemplot (Stem and Leaf Plot)

65	13	75	89	92	73	82	85
92	87	95	62	79	82	91	87
65	81	92	86	31	63	74	85

Key

6 | 5 = 65

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



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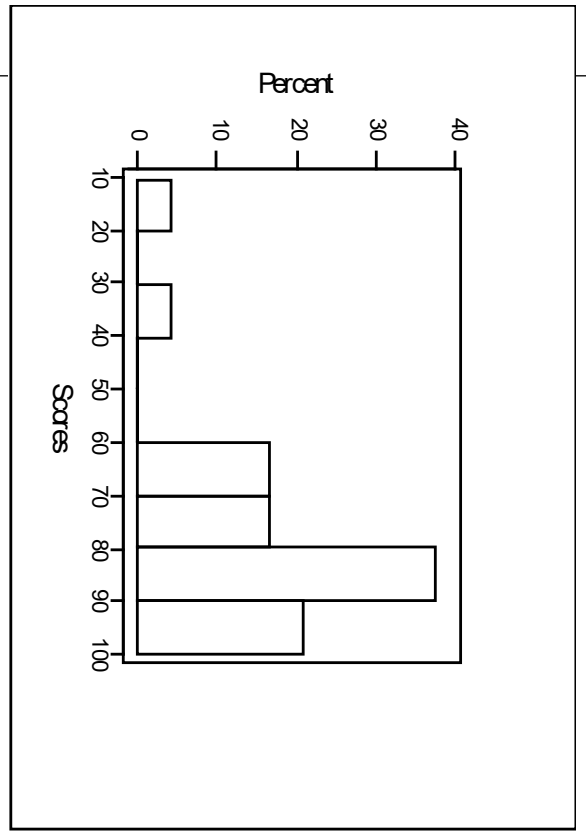
Key

6 | 5 = 65

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



In order:

13 31 62 63 65 73 74 75 79 81 82
82 85 85 86 87 89 91 92 92 92 95