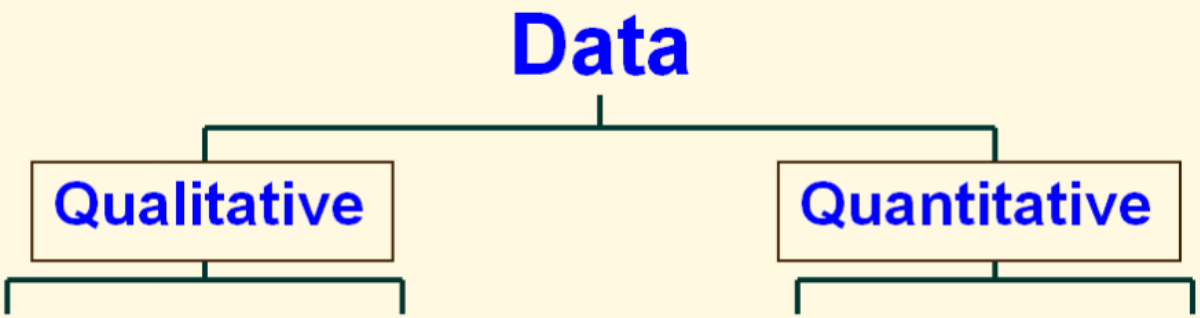
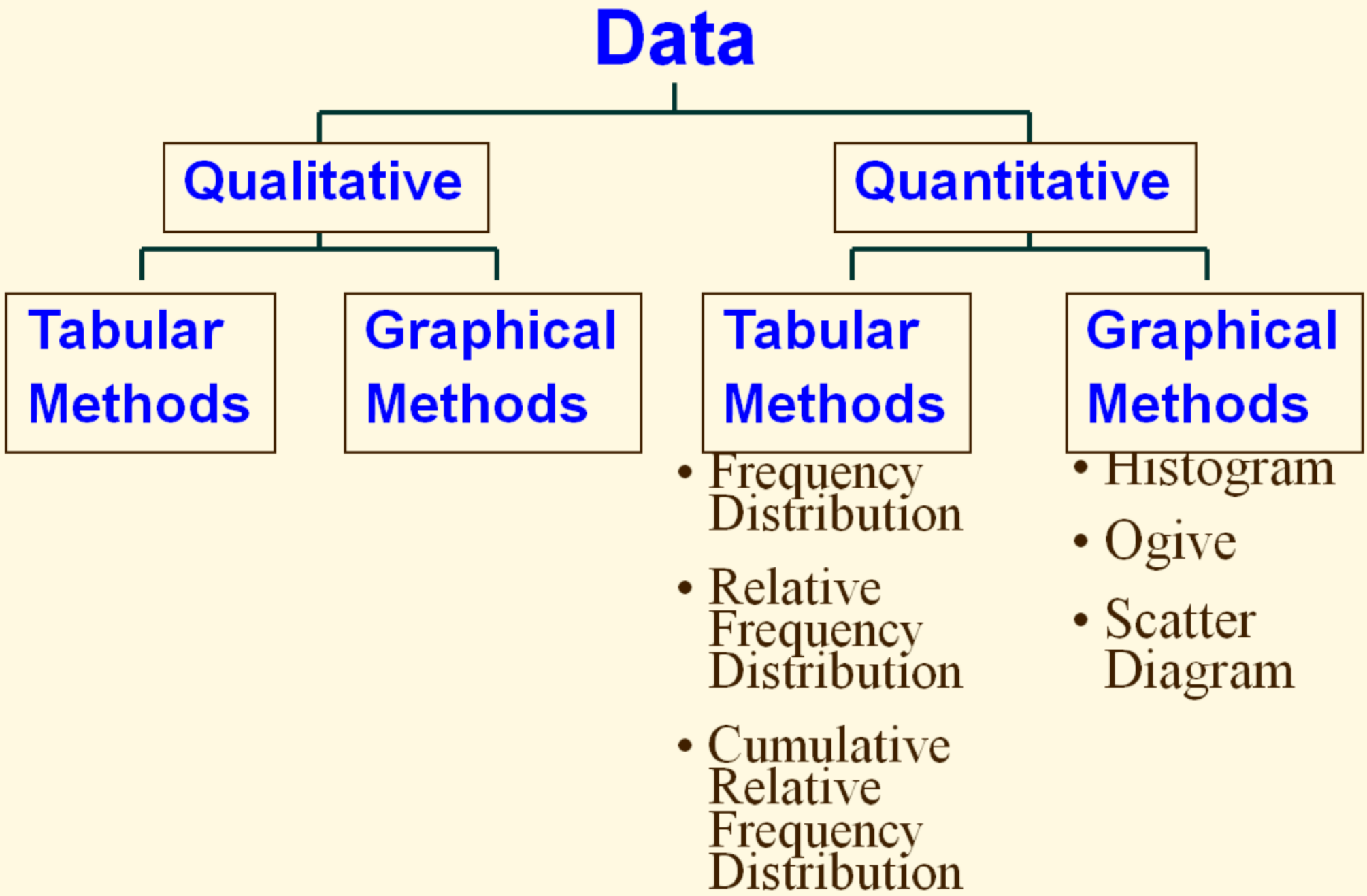
Chapter 2




Data
Qualitative
Quantitative
Tabular Methods
Graphical Methods
Tabular Methods
Graphical Methods
• Frequency Distribution
• Relative Frequency Distribution
• Cumulative Relative Frequency Distribution
• Histogram
• Ogive
• Scatter Diagram

Ungrouped Quantitative Data

- Each observation has an exact value
- The observations are either interval data or ratio data

Sanderson and Clifford
End of Year Audit Times (days)

12	14	19	18
15	15	18	17
20	27	22	23
22	21	33	28
14	18	16	13

Grouped Quantitative Data

- Exact values of observations are not known.
- Values fall within an interval or group of values.
- The observations are either interval data or ratio data

Frequency Distribution (f)

A frequency distribution is a tabular summary of a set of data showing the frequency (or number) of items in each of several non-overlapping classes

Sanderson and Clifford Year-End Audit Times

Class Limits	Tallies	Class Frequency
10 - 14	////	4
15 - 19	////////	8
20 - 24	/////	5
25 - 29	//	2
30 - 34	/	1
	Total Frequency	20

Relative Frequency Distribution (rf)

f_i

Sanderson and C Year-End Audit

Class Limits (days)	Class Frequency

of data showing the
nber) of items in each
rlapping classes

Relative Frequency Distribution (rf)

$$rf_i = \frac{f_i}{n}$$

Where rf_i is the relative frequency of class i
f_i is the frequency of class i
n is the total number of observations

Sanderson and Clifford Year-End Audit Times

Class Limits (days)	Class Frequency	Relative Frequency	
10 - 14	4	=4/20	0.20
15 - 19	8	=8/20	0.40
20 - 24	5	=5/20	0.25
25 - 29	2	=2/20	0.10
30 - 34	1	=1/20	0.05
	20		1.00

Cumulative Frequency

Sander
Year-E

Cumulative Frequency Distribution (cf)

Cumulative Relative Frequency Distribution (crf)

$$crf_i = \frac{cf_i}{n}$$

Sanderson and Clifford Year-End Audit Times

Class Limits	Class Frequency	Cumulative Frequency		Cumulative Relative Frequency	
10 - 14	4	=4	4	=4/20	0.20
15 - 19	8	=4+8	12	=12/20	0.60
20 - 24	5	=4+8+5	17	=17/20	0.85
25 - 29	2	=4+8+5+2	19	=19/20	0.95
30 - 34	1	=4+8+5+2+1	20	=20/20	1.00
	20				

Definitions

Class Limits

the starting and ending values for a particular class.
However, when does one class truly end and another begin?

True Class Limits

lower true class limit = lower class limit - half unit
upper true class limit = upper class limit + half unit

Midpoint

$$M_i = \frac{Upper\ Class\ Limit\ +\ Lower\ Class\ Limit}{2}$$

Class Width

$$Approximate\ Class\ Width = \frac{Largest\ Value\ -\ Smallest\ Value}{Number\ of\ Classes}$$

Number of Classes

the number of groups or intervals required to contain the data. The classes are both exclusive and exhaustive.

A technical method for estimating the number of classes is called Sturges' Rule:
number of classes = 1 + 3.322 Log(n)

number of classes = 1 + 3.322 log(20)
= 1 + 3.322*1.301
= 5.322021
round number of classes to either 5 or 6

Half Unit

(.5 * Unit)

Unit (unit of measure)

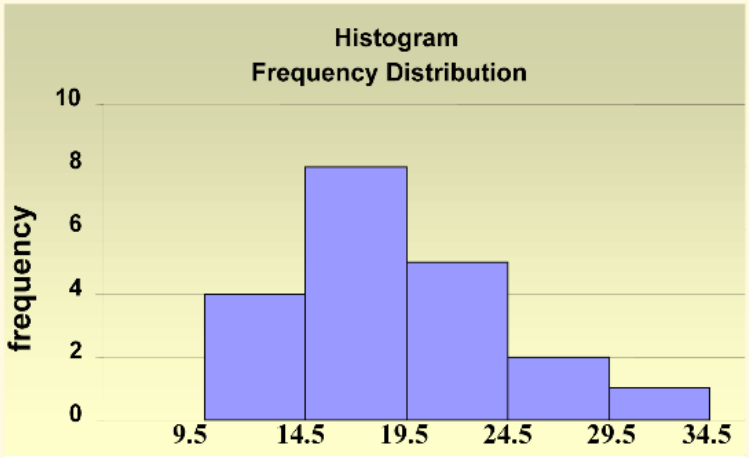
the smallest resolution of data that is measured.

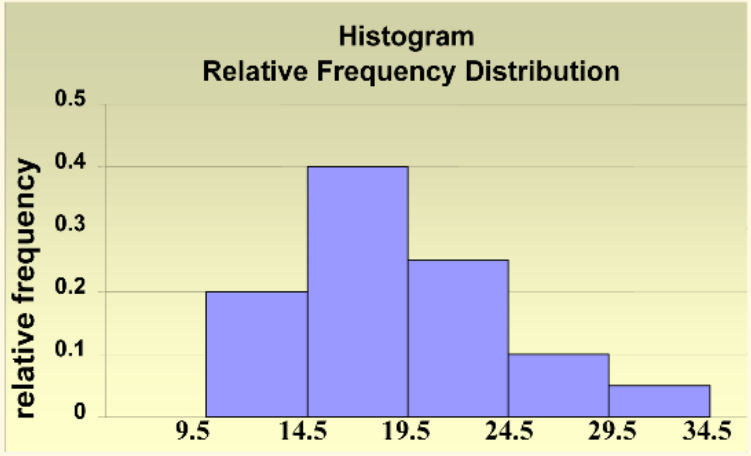
Examples
housing is measured in $1,000
cars are measured in $100
valve diameters are measured in .001"
Text Example : 1 day

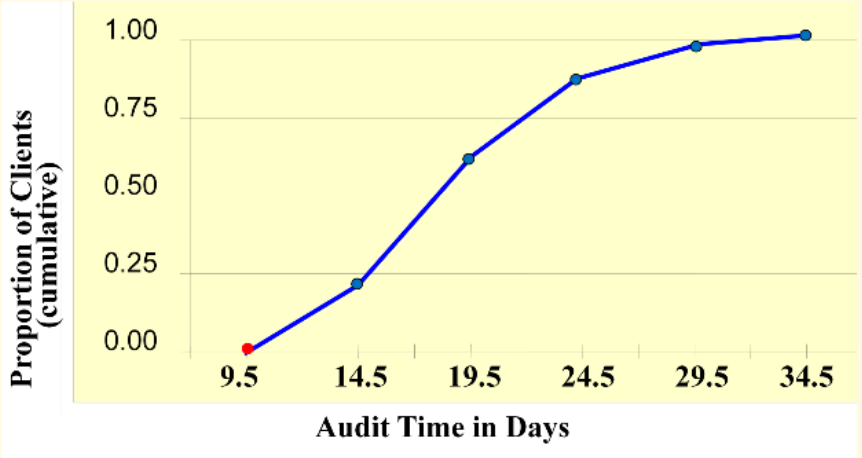
Construction of Graphs

Histogram

- use true class limits
- use frequency or relative frequency
- adjacent bars on the histogram touch
- width of bars are uniform indicating a consistent class width
- use only with quantitative data, therefore, it is different from a bar chart which can use qualitative data





Ogive - Cumulative Distribution

- use true class limits on the horizontal axis
- use cumulative frequency or cumulative relative frequency
- for each class plot at the true upper class limit a point corresponding to the cfi or crfi
- for the first class plot at the true lower class limit a point on the horizontal axis
- connect the dots with a straight line