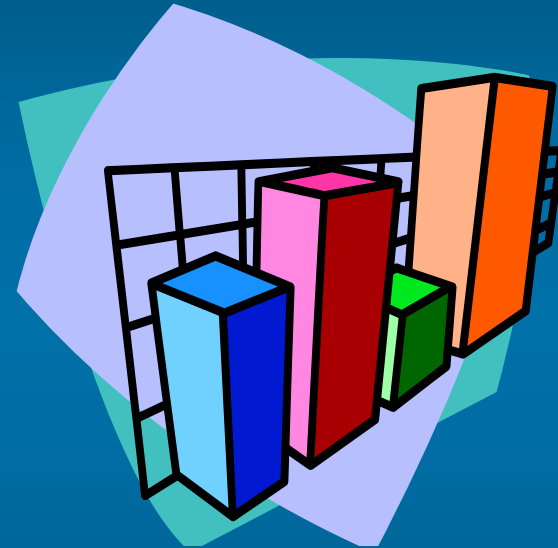


Descriptive Statistics: Tabular and Graphical Presentations

- q Summarizing Qualitative Data
- q Summarizing Quantitative Data



Summarizing Qualitative Data

- q Frequency Distribution
- q Relative Frequency Distribution
- q Cumulative Frequency
- q Cumulative Relative Frequency
- q Bar Graph
- q Pie Chart

Example: Marada Inn

Guests staying at Marada Inn were asked to rate the quality of their accommodations as being *excellent*, *above average*, *average*, *below average*, or *poor*. The ratings provided by a sample of 20 guests are:



Below Average	Average	Above Average
Above Average	Above Average	Above Average
Above Average	Below Average	Below Average
Average	Poor	Poor
Above Average	Excellent	Above Average
Average	Above Average	Average
Above Average	Average	

Frequency Distribution



<u>Rating</u>	<u>Frequency</u>	<u>Cumulative Frequency</u>
Poor	2	2
Below Average	3	5
Average	5	10
Above Average	9	19
Excellent	<u>1</u>	20
Total	20	

▶

$2+3+5 = 10$

Relative Frequency and Percent Frequency Distributions



<u>Rating</u>	<u>Relative Frequency</u>	<u>Cumulative Relative Frequency</u>
Poor	.10	.10
Below Average	.15	.25
Average	.25	.50
Above Average	.45	.95
Excellent	<u>.05</u>	1.0
Total	1.00	

$.10 + .15 = .25$

$1/20 = .05$

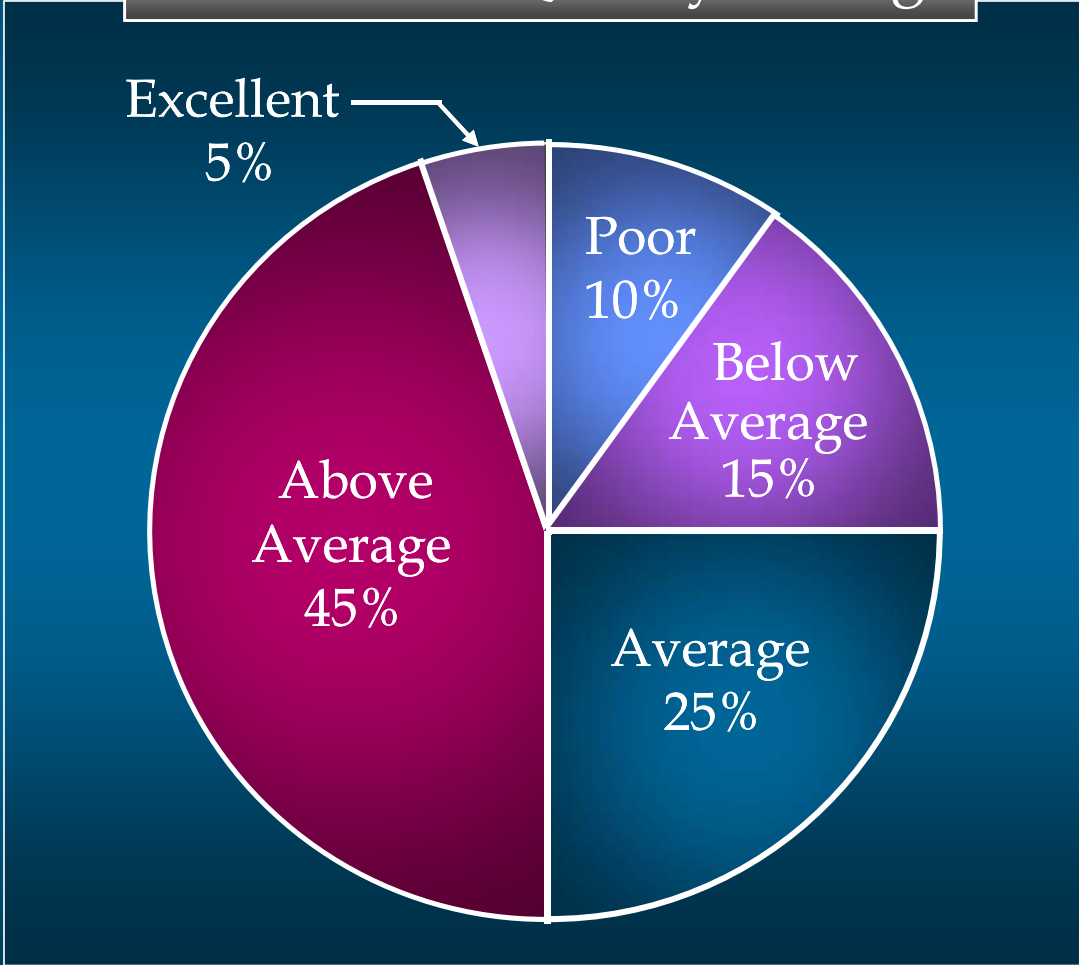
Bar Graph



Pie Chart



Marada Inn Quality Ratings



Summarizing Quantitative Data

- q Frequency Distribution
- q Relative Frequency Distributions
- q Histogram
- q Cumulative Distributions

Example: Hudson Auto Repair

- ▶ The manager of Hudson Auto would like to have a better understanding of the cost of parts used in the engine tune-ups performed in the shop. She examines 50 customer invoices for tune-ups. The costs of parts, rounded to the nearest dollar, are listed on the next slide.



Example: Hudson Auto Repair



q Sample of Parts Cost for 50 Tune-ups

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

Frequency Distribution

q Guidelines for Selecting Number of Classes

- ▶ • Use between 5 and 20 classes.
- ▶ • Data sets with a larger number of elements usually require a larger number of classes.
- ▶ • Smaller data sets usually require fewer classes

Frequency Distribution

q Guidelines for Selecting Width of Classes

- ▶ • Use classes of equal width.
- ▶ • Approximate Class Width =

$$\frac{\text{Largest Data Value} - \text{Smallest Data Value}}{\text{Number of Classes}}$$

Frequency Distribution



For Hudson Auto Repair, if we choose six classes:

- ▶ Approximate Class Width = $(109 - 52)/6 = 9.5 \cong 10$

<u>Parts Cost (\$)</u>	<u>Frequency</u>
50-59	2
60-69	13
70-79	16
80-89	7
90-99	7
100-109	<u>5</u>
Total	50

Relative Frequency Distribution



<u>Parts Cost (\$)</u>	<u>Relative Frequency</u>
50-59	.04
60-69	.26
70-79	.32
80-89	.14
90-99	.14
100-109	<u>.10</u>
Total	1.00

2/50

Cumulative Distributions



q Hudson Auto Repair

<u>Cost (\$)</u>	<u>Frequency</u>	<u>Cumulative Frequency</u>	<u>Cumulative Relative Frequency</u>	<u>Cumulative Percent Frequency</u>
50 - 59	2	2	.04	4
60 - 69	13	15	.30	30
70 - 79	16	31	.62	62
80 - 89	7	38	.76	76
90 - 99	7	45	.90	90
100 - 109	5	50	1.00	100

$2 + 13$

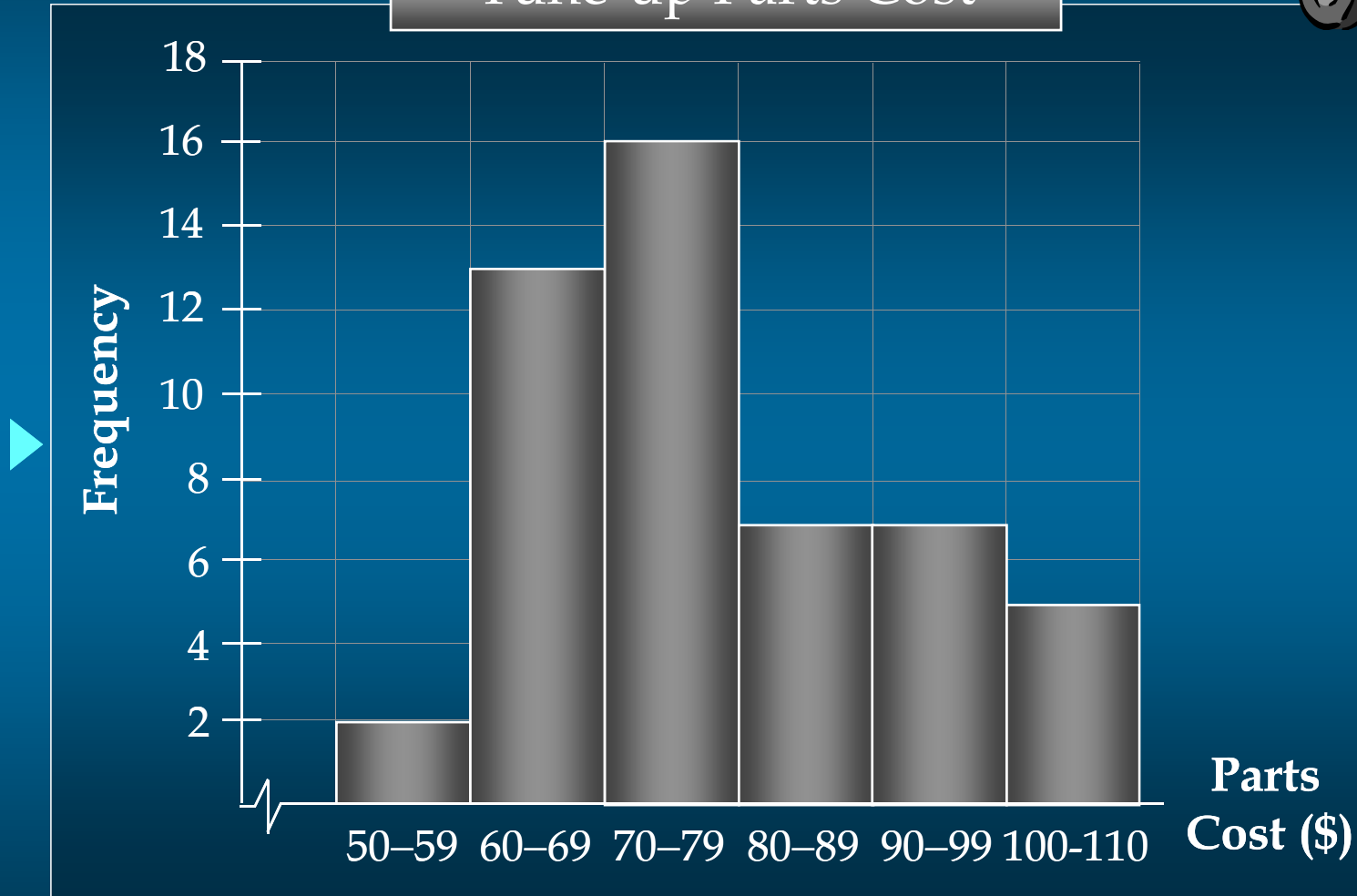
$15/50$

$.30(100)$

Histogram



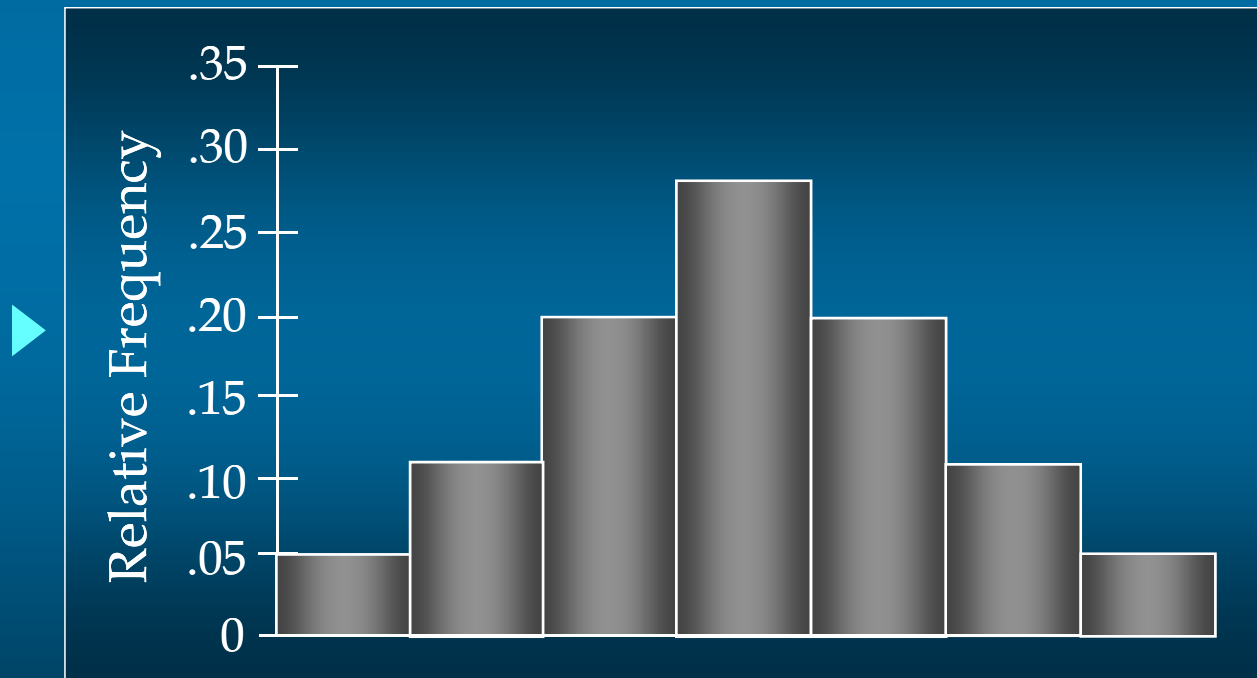
Tune-up Parts Cost



Histogram

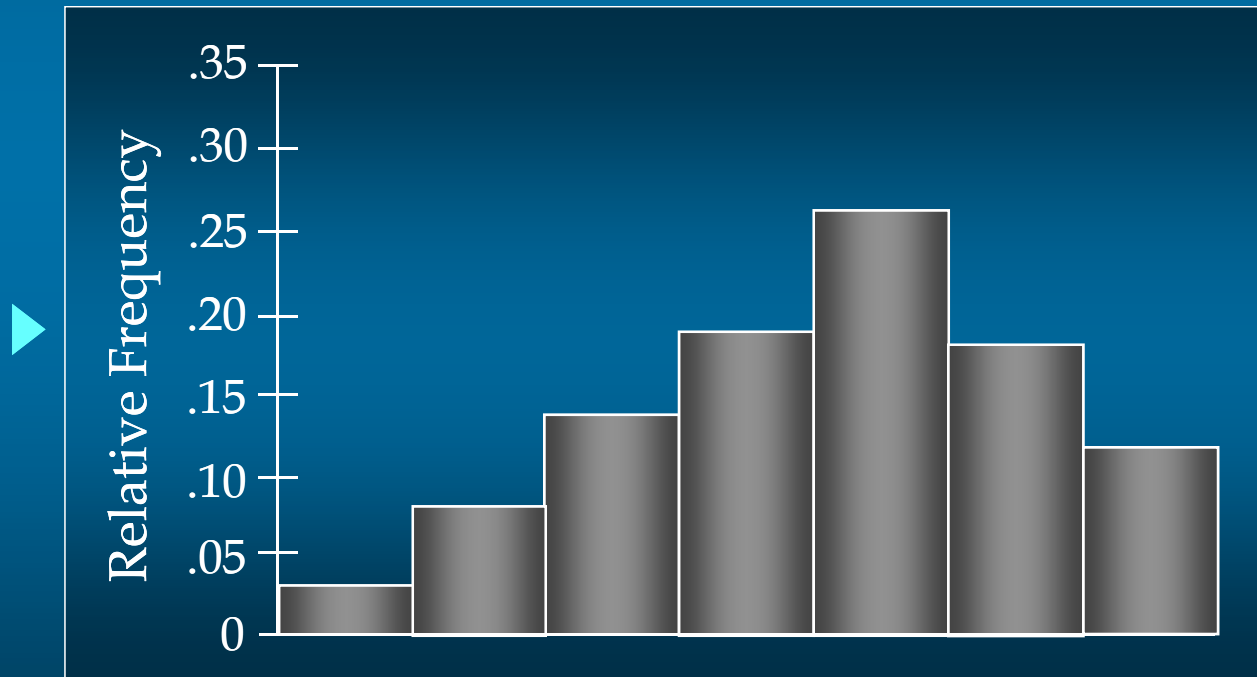
q Symmetric

- Left tail is the mirror image of the right tail
- Examples: heights and weights of people



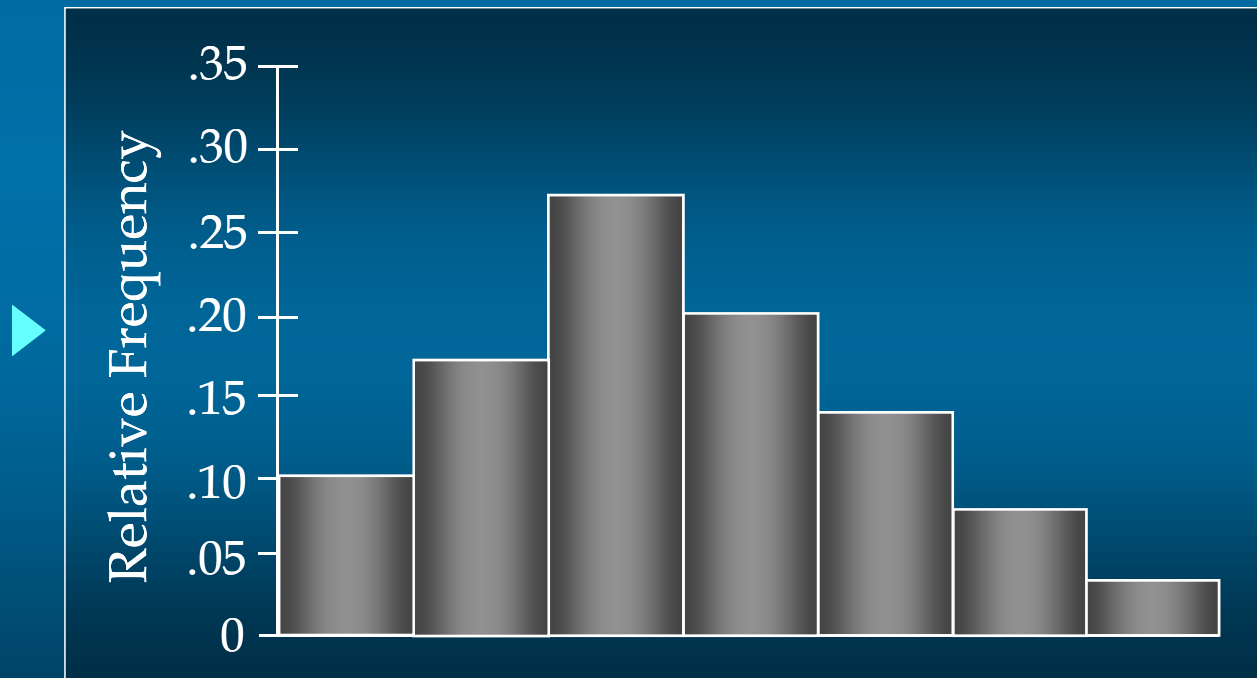
Histogram

- q Moderately Skewed Left
 - A longer tail to the left
 - Example: exam scores



Histogram

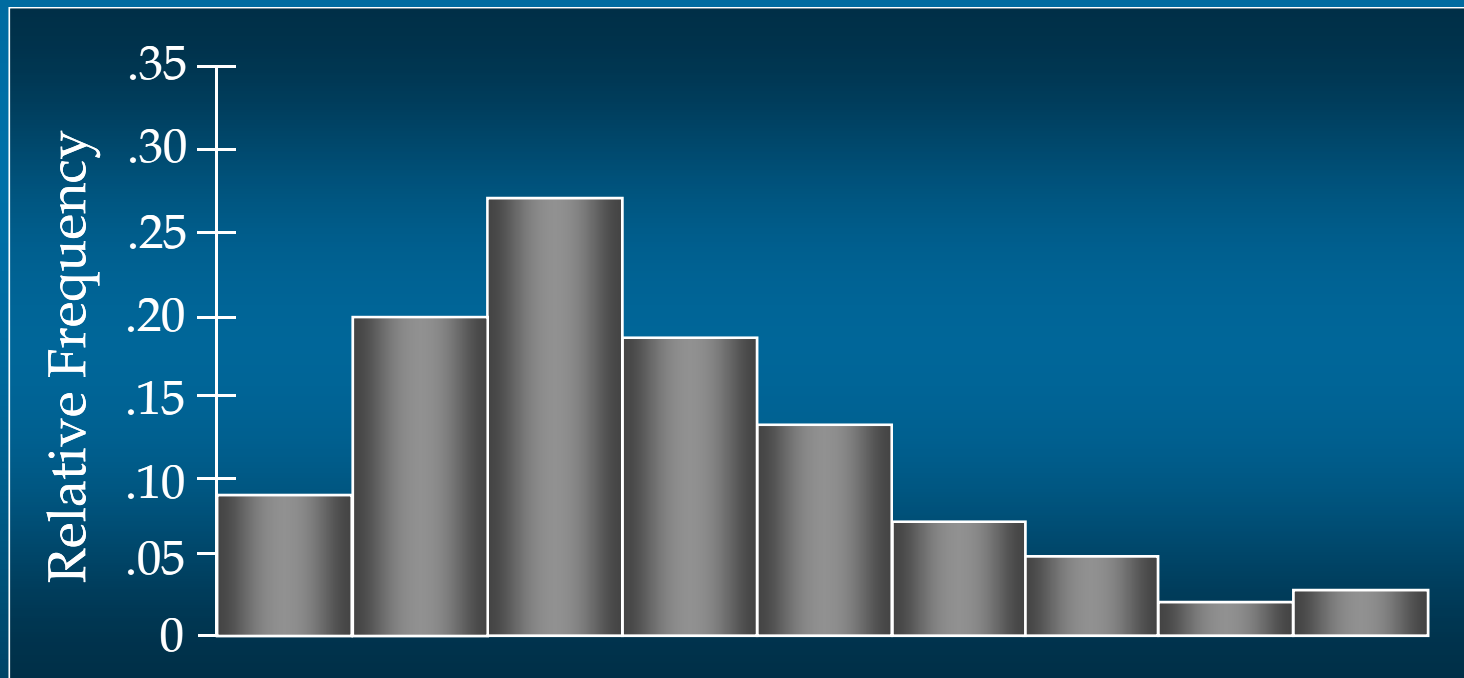
- q Moderately Right Skewed
 - A Longer tail to the right
 - Example: housing values



Histogram

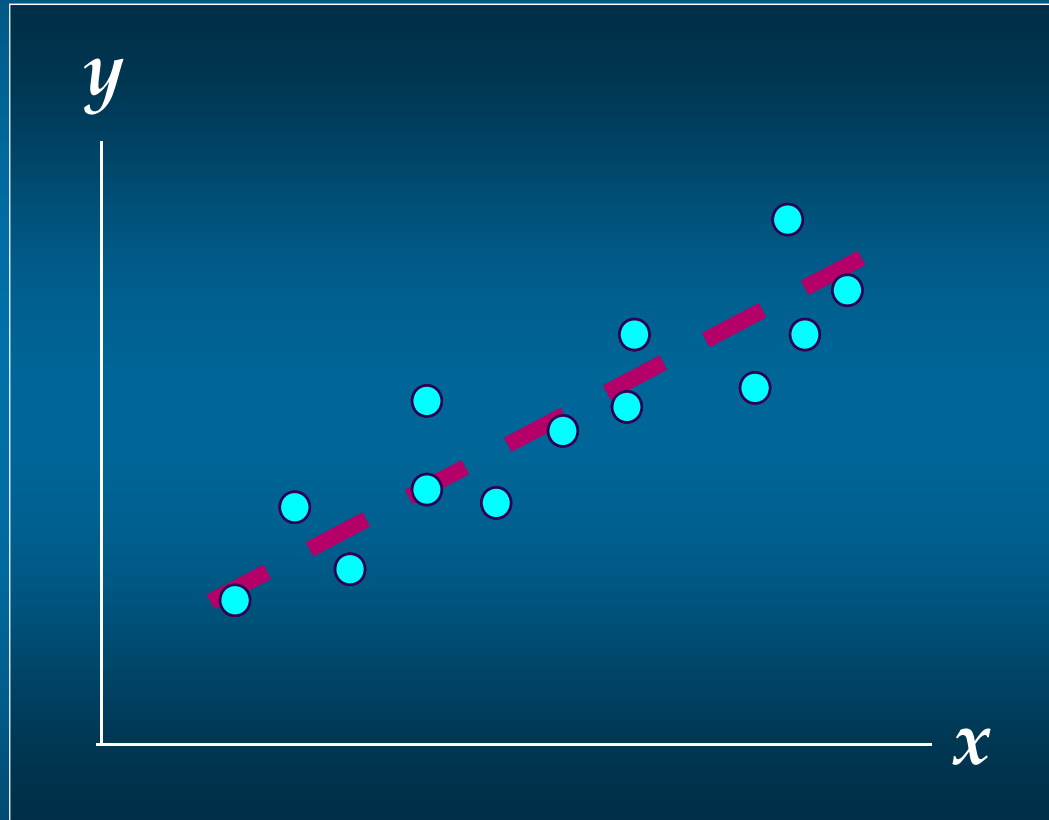
q Highly Skewed Right

- A very long tail to the right
- Example: executive salaries



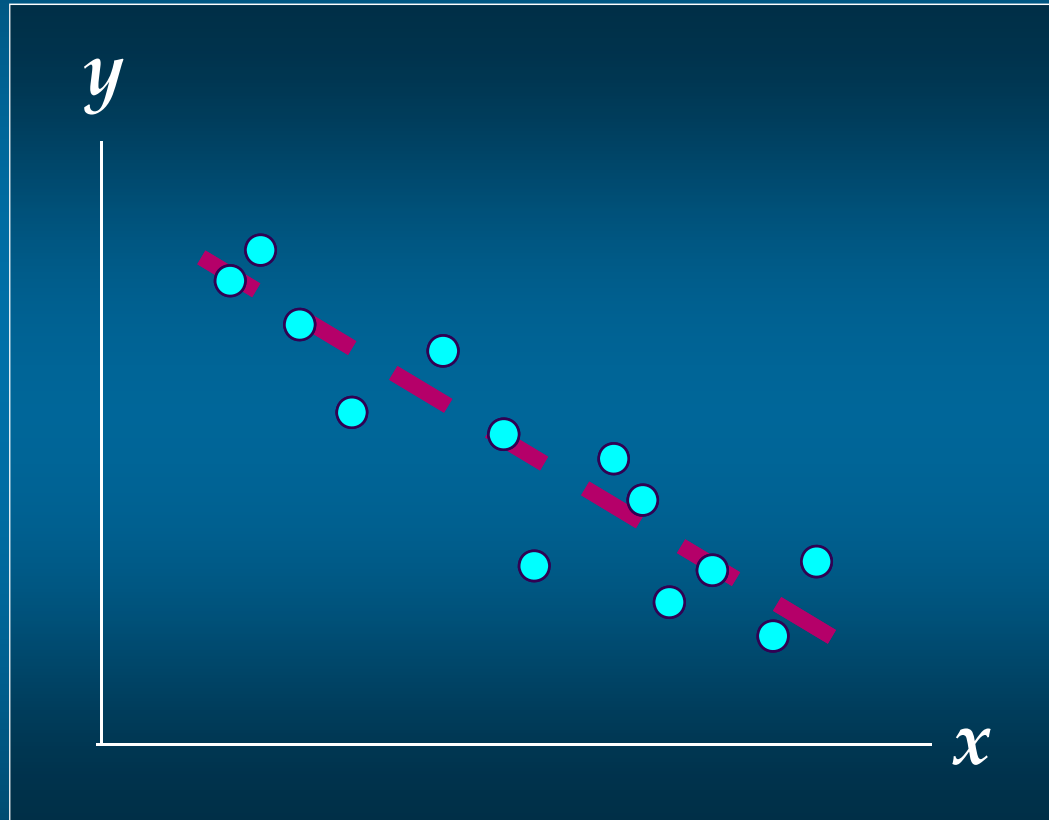
Scatter Diagram

q A Positive Relationship



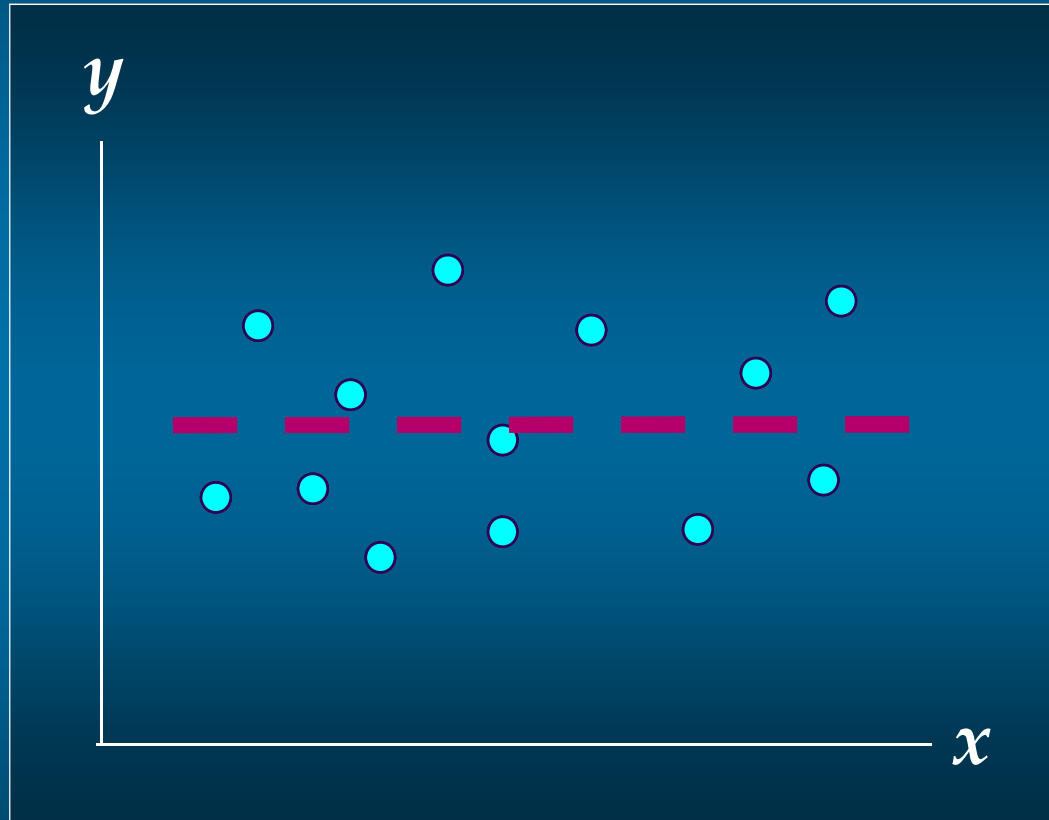
Scatter Diagram

q A Negative Relationship



Scatter Diagram

q No Apparent Relationship



Example: Panthers Football Team

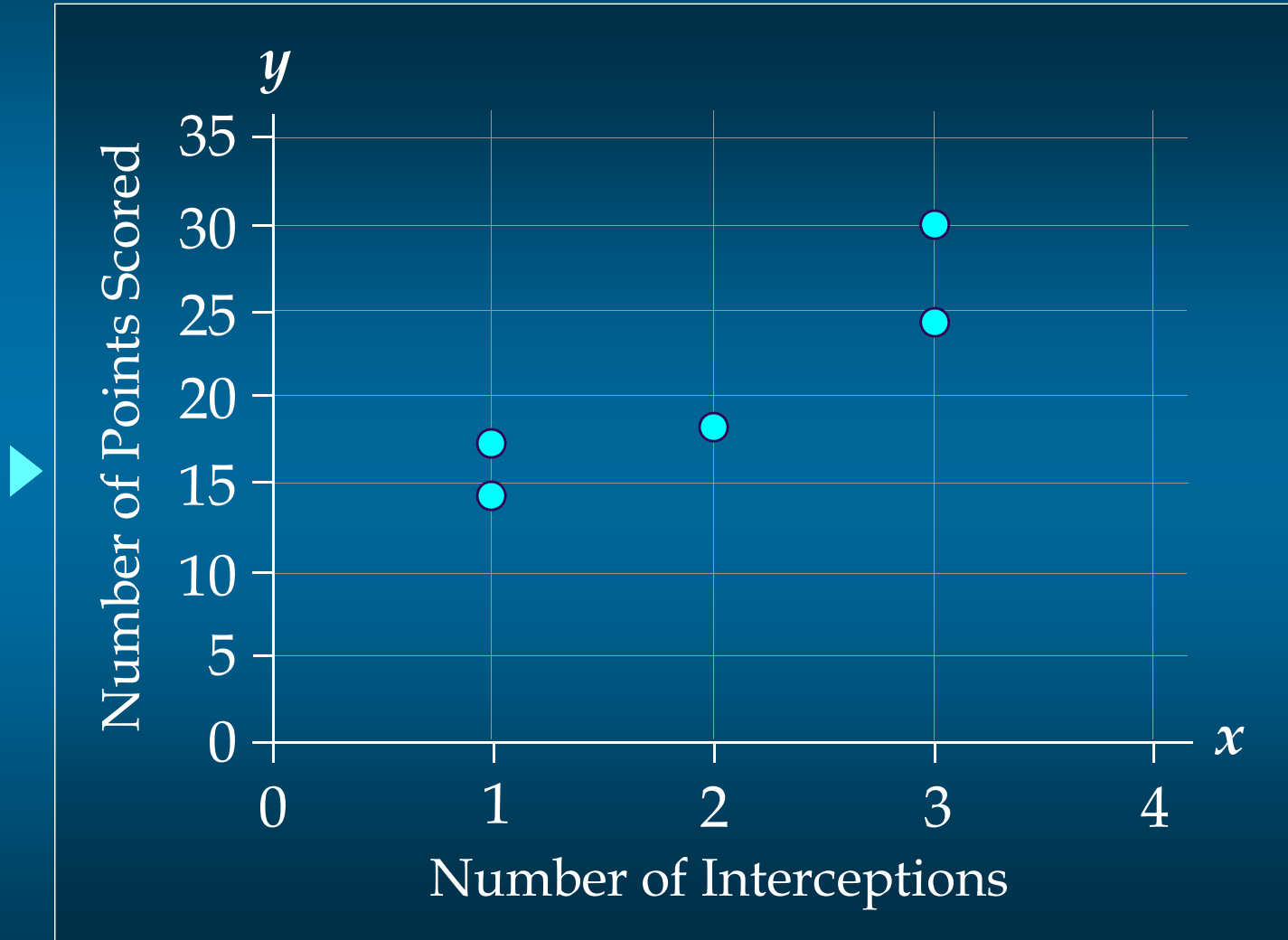
q Scatter Diagram

The Panthers football team is interested in investigating the relationship, if any, between interceptions made and points scored.



$x =$ Number of <u>Interceptions</u>	$y =$ Number of <u>Points Scored</u>
1	14
3	24
2	18
1	17
3	30

Scatter Diagram



Tabular and Graphical Procedures

