



***Describing Data:***  
**Pengumpulan, pengolahan dan**  
**Penyajian Data**

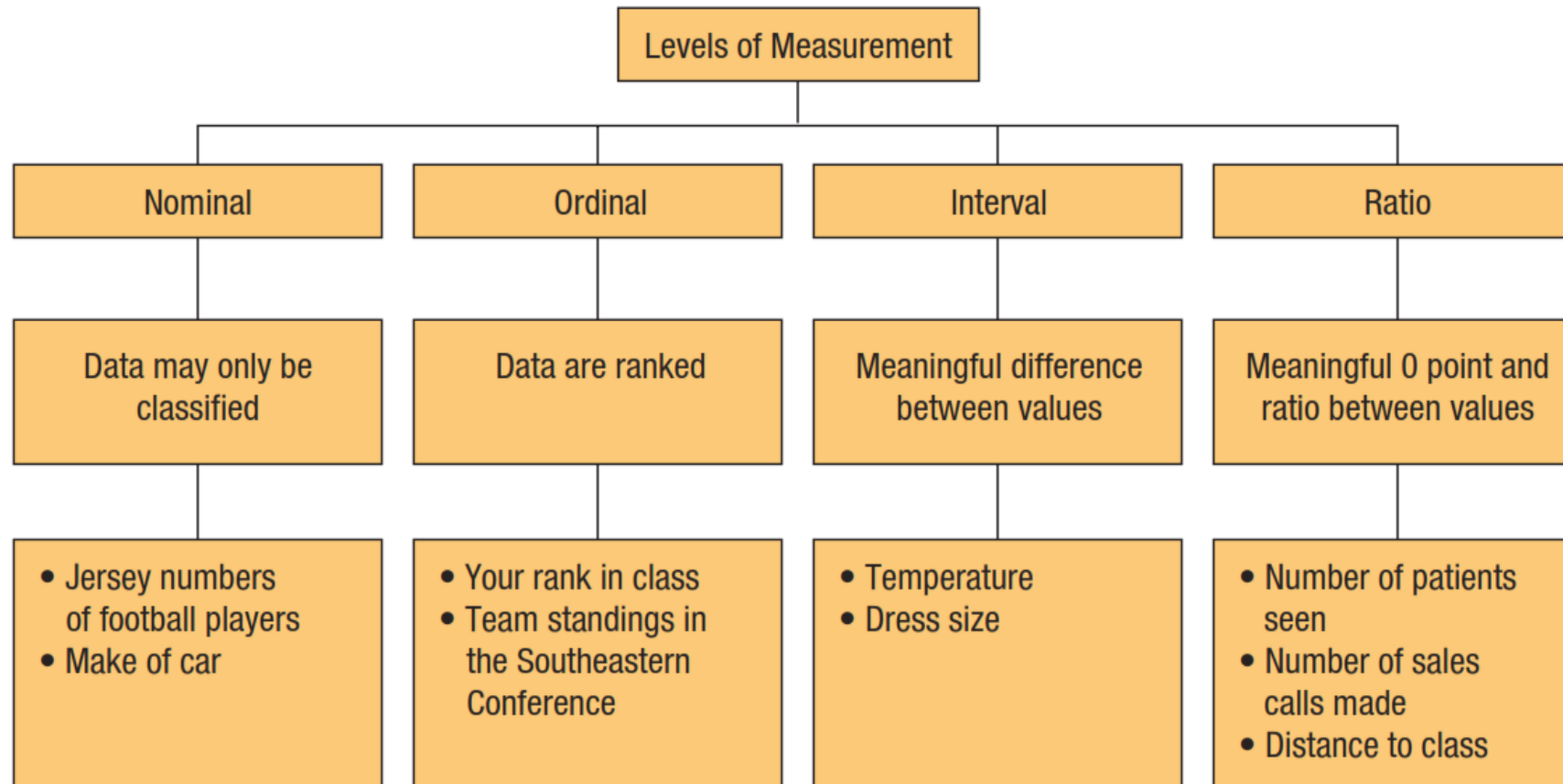
Pertemuan 2: Statistika Bisnis

ISNA PUTRI R-PRODI AKUNTANSI FEB UNS

**Tabel 1.1.** Hasil Lomba Deklamasi Perayaan Hari Kartini Siswa SDM Kolombo

No.	Nama	Kelas	Nilai				Juara Ke-	Hadiah
			Yuri 1	Yuri 2	Yuri 3	Total		
1.	Adit	3	86	70	77	233	1	Rp 25.000,00
2.	Irma	3	71	70	88	229	2	Rp 15.000,00
3.	Ika	4	70	70	88	228	3	Rp 10.000,00
4.	Desi	3	88	60	66	214	4	Rp 7.500,00
5.	Eko	4	75	60	77	212		5 buku tulis
6.	Uun	4	70	70	66	206		5 buku tulis
7.	Ani	5	63	60	77	200		5 buku tulis
8.	Lia	5	59	60	77	196		5 buku tulis
9.	Iin	6	55	50	77	182		5 buku tulis
10.	Ana	6	60	50	66	176		5 buku tulis

# DATA/VARIABEL MENURUT TINGKAT PENGUKURAN



**CHART 1–3** Summary and Examples of the Characteristics for Levels of Measurement

# Skala

- Skala Nominal: angka yang berfungsi hanya sbg pengganti nama.
- Skala kategorikal/klasifikasi

- Skala ordinal → angka yang selain berfungsi sbg pengganti nama, menunjukkan setiap gejala memiliki intensitas tinggi/rendah.
- Skala peringkat

- Data interval → data yang mempunyai ciri skala ordinal, tapi jarak antar bilangan diketahui
- Biasanya untuk penilaian

- Skala rasio → data yang mempunyai ciri skala interval tetapi memiliki bilangan 0 (untuk titik awal perhitungan)

# Nominal-Level Data

Properties:

1. Observations of a qualitative variable can only be **classified** and **counted**.
2. There is **no particular order** to the labels.



# Ordinal-Level Data

## Properties:

1. Data classifications are represented by sets of labels or names (high, medium, low) that have **relative values**.
2. Because of the relative values, the **data classified can be ranked or ordered**.

Rating of a Finance Professor

Rating	Frequency
Superior	6
Good	28
Average	25
Poor	12
Inferior	3

# Interval-Level Data

## Properties:

1. Data classifications are ordered according to the amount of the characteristic they possess.
2. Equal differences in the characteristic are represented by equal differences in the measurements.

Example: Women's dress sizes listed on the table.

Size	Bust (in)	Waist (in)	Hips (in)
8	32	24	35
10	34	26	37
12	36	28	39
14	38	30	41
16	40	32	43
18	42	34	45
20	44	36	47
22	46	38	49
24	48	40	51
26	50	42	53
28	52	44	55

# Ratio-Level Data

- Practically all quantitative data is recorded on the ratio level of measurement.
- Ratio level is the “highest” level of measurement.

## Properties:

1. Data classifications are **ordered** according to the amount of the characteristics they possess.
2. Equal differences in the characteristic are represented by equal differences in the numbers assigned to the classifications.
3. The zero point is the absence of the characteristic, and the ratio between two numbers is meaningful.





# Learning Objective

1. Meringkas **variable kualitatif** dengan table frekuensi dan frekuensi relative.
2. Menyajikan table frekuensi dengan **bar/pie chart**
3. Meringkas **variable kuantitatif** dengan table frekuensi dan frekuensi relative.
4. Menyajikan table frekuensi dengan **histogram/polygon**

# INTRODUCTION

Industri ritel mobil Amerika Serikat sangat kompetitif



APPLEWOOD AUTO GROUP					
	A	B	C	D	E
1	Age	Profit	Location	Vehicle-Type	Previous
2	21	\$1,387	Tionesta	Sedan	0
3	23	\$1,754	Sheffield	SUV	1
4	24	\$1,817	Sheffield	Hybrid	1
5	25	\$1,040	Sheffield	Compact	0
6	26	\$1,273	Kane	Sedan	1
7	27	\$1,529	Sheffield	Sedan	1
8	27	\$3,082	Kane	Truck	0
9	28	\$1,951	Kane	SUV	1
10	28	\$2,692	Tionesta	Compact	0
11	29	\$1,206	Sheffield	Sedan	0
12	29	\$1,342	Kane	Sedan	2
13	30	\$443	Kane	Sedan	3
14	30	\$754	Olean	Sedan	2
15	30	\$1,621	Sheffield	Truck	1

*Applewood*  
Auto Group

melacak dan menganalisis penjualan kendaraan dan profitabilitas kendaraan tersebut.

# FREQUENCY TABLE (Tabel Frekuensi)

- Teknik yang digunakan untuk mendeskripsikan sekumpulan data → statistic deskriptif.
- Statistik deskriptif:
  - ✓ mengatur data
  - ✓ untuk menunjukkan pola data
  - ✓ identifikasi nilai yang mana yang cenderung banyak, untuk menelaskan data yang ekstrim/unusual.
- Salah satu Teknik yang digunakan: FREQUENCY TABLE (Tabel Frekuensi)




**Tabel → bentuk penyajian data berisi kumpulan angka-angka yang disusun menurut kategori-kategori atau pengelompokan nilai data**

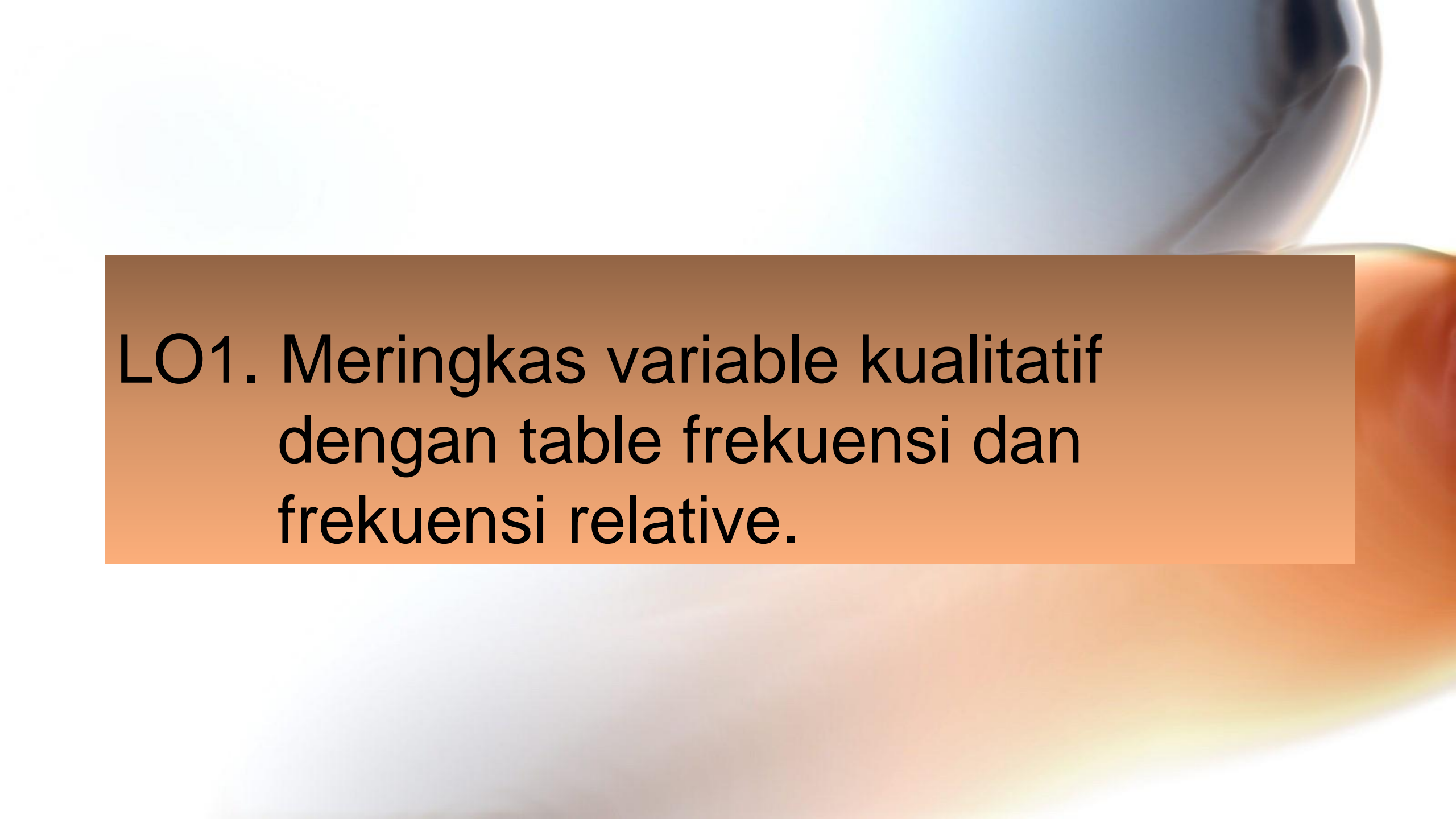
# DATA KUALITATIF VS KUANTITATIF

1

DATA  
KUALITATIF

2

DATA  
KUANTITATIF



LO1. Meringkas variable kualitatif dengan table frekuensi dan frekuensi relative.

# Applewood Auto Group Case

age of the buyer,

amount of profit,

dealer that made the sale,

type of vehicle sold,

number of previous purchases by the buyer

DATA  
KUALITATIF

DATA  
KUANTITATIF

summarize last month's sales by location



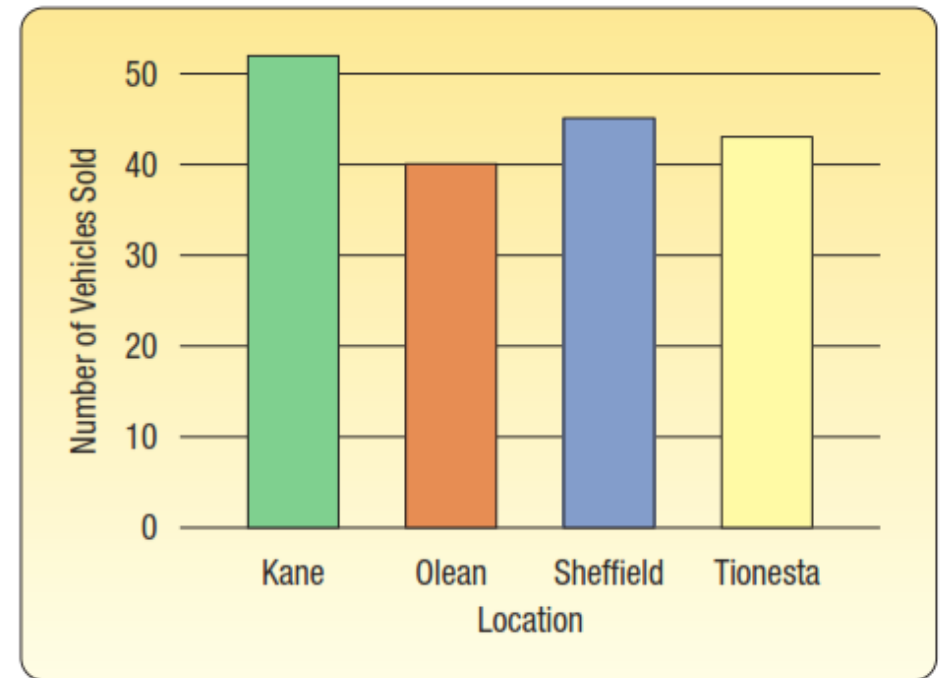
Frekuensi relatif → menangkap hubungan antara frekuensi kelas dan jumlah total observasi.

Location	Number of Cars
Kane	52
Olean	40
Sheffield	45
Tionesta	43
Total	180

Location	Number of Cars	Relative Frequency	Found by
Kane	52	.289	52/180
Olean	40	.222	40/180
Sheffield	45	.250	45/180
Tionesta	43	.239	43/180
Total	180	1.000	

## 2. MENYAJIKAN GRAFIK DATA KUALITATIF

Location	Number of Cars
Kane	52
Olean	40
Sheffield	45
Tionesta	43
Total	180



**BAR CHART**

BAR CHART → Grafik yang menunjukkan kelas kualitatif pada sumbu horizontal dan frekuensi kelas pada sumbu vertikal. Frekuensi kelas sebanding dengan tinggi balok.



## 2. MENYAJIKAN GRAFIK DATA KUALITATIF

TABLE 2-3 Vehicle Sales by Type at Applewood Auto Group

Vehicle Type	Number Sold	Percent Sold
Sedan	72	40
SUV	54	30
Compact	27	15
Truck	18	10
Hybrid	9	5
Total	180	100

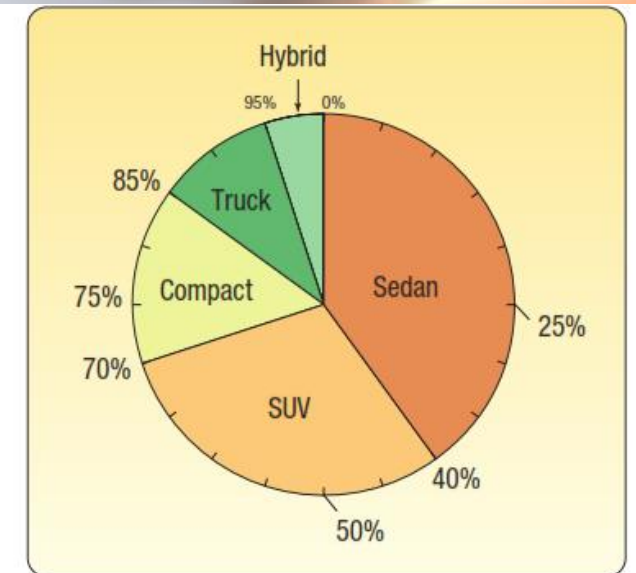
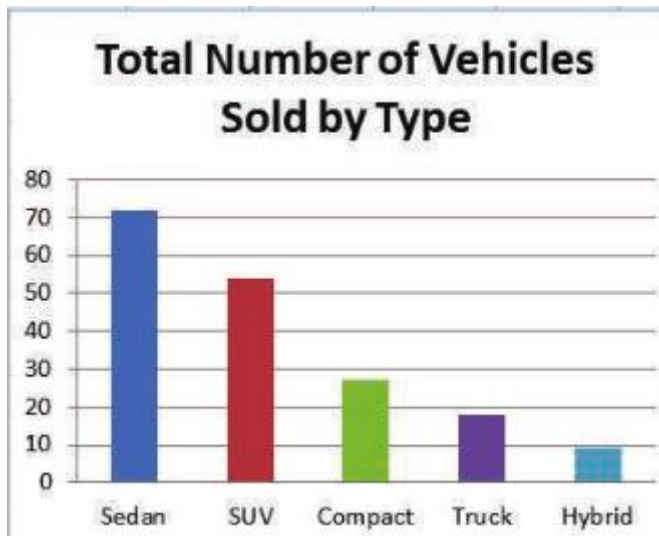


CHART 2-2 Pie Chart of Vehicles by Type

**BAR CHART**

**PIE CHART**

PIE CHART → Bagan yang menunjukkan proporsi atau persentase yang diwakili oleh setiap kelas dari jumlah total frekuensi.



## Contoh:

- SkiLodges.com sedang menguji pemasaran situs web barunya dan tertarik pada betapa mudahnya desain situs webnya dinavigasi. Perusahaan secara acak memilih 200 pengguna Internet biasa dan meminta mereka untuk melakukan tugas pencarian di situs web. Setiap orang diminta untuk menilai kemudahan navigasi relatif sebagai **poor, good, excellent, or awesome**. Hasilnya ditunjukkan pada tabel berikut:

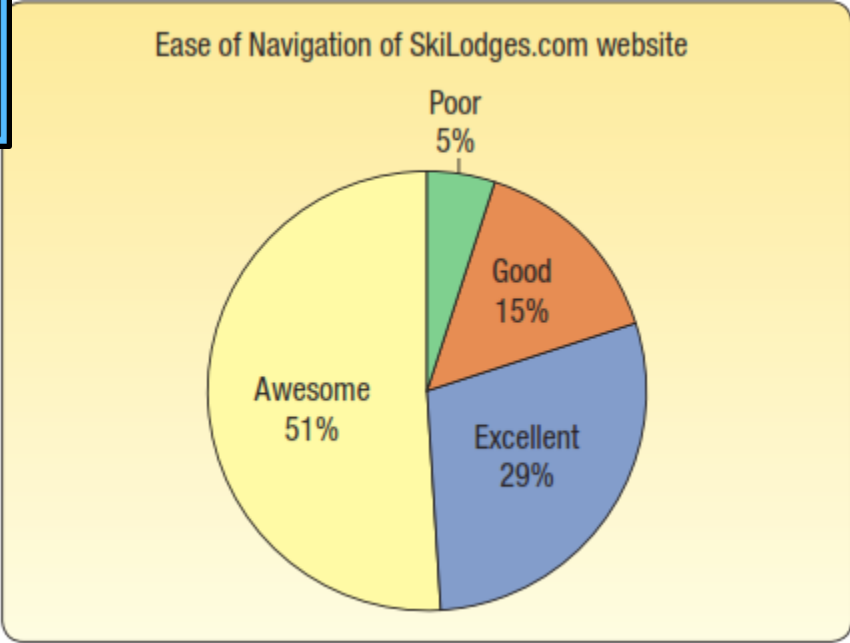
Awesome	102
Excellent	58
Good	30
Poor	10

- Pertanyaan:
  1. Jenis skala pengukuran apa yang digunakan untuk kemudahan navigasi?
  2. Gambarlah diagram batang untuk hasil survei.
  3. Buat diagram pie untuk hasil survei.

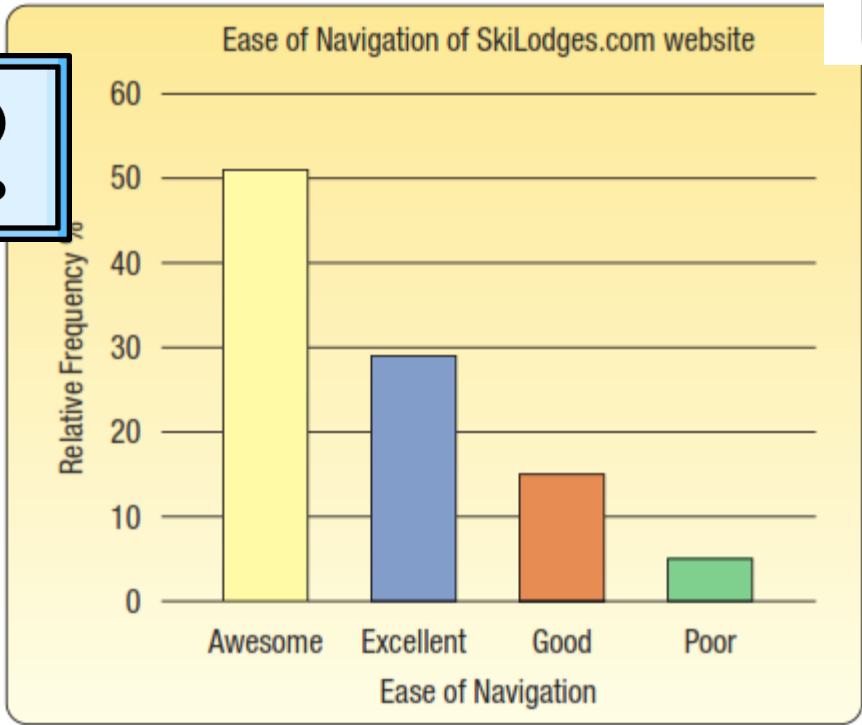
1

Data tersebut diukur pada **skala ordinal**. Artinya, skala diberi **peringkat** dalam navigasi yang relatif mudah saat berpindah dari "awesome" ke "poor".

3



2



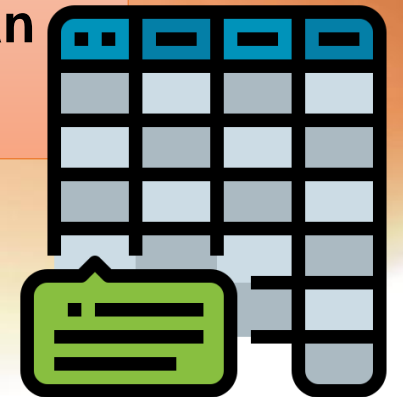
3. Meringkas variable kuantitatif dengan table frekuensi dan **frekuensi relative.**



Ingin mendapatkan informasi → ringkasan penjualan berdasarkan profit yang didapatkan per kendaraan

### DISTRIBUSI FREKUENSI

Kelompok data **kuantitatif** yang dikelompokkan berdasarkan kelas dan jumlah obeservasi tiap kelas





## CONTOH 2-4

- Ms. Kathryn Ball dari **Applewood Auto Group** ingin meringkas keuntungan variabel kuantitatif dengan distribusi frekuensi dan menampilkan distribusi dengan bagan dan grafik.
- Dengan informasi ini, Ms. Ball dapat dengan mudah menjawab pertanyaan-pertanyaan berikut: Berapa keuntungan khas dari setiap penjualan? Berapa keuntungan terbesar atau maksimum dari setiap penjualan? Berapa keuntungan terkecil atau minimum dari suatu penjualan? Sekitar nilai apa yang cenderung dikelompokkan oleh keuntungan?
- Data laba pada kendaraan yang terjual (180 data)

TABLE 2-4 Profit on Vehicles Sold Last Month by the Applewood Auto Group

\$1,387	\$2,148	\$2,201	\$ 963	\$ 820	\$2,230	\$3,043	\$2,584	\$2,370
1,754	2,207	996	1,298	1,266	2,341	1,059	2,666	2,637
1,817	2,252	2,813	1,410	1,741	3,292	1,674	2,991	1,426
1,040	1,428	323	1,553	1,772	1,108	1,807	934	2,944
1,273	1,889	352	1,648	1,932	1,295	2,056	2,063	2,147
1,529	1,166	482	2,071	2,350	1,344	2,236	2,083	1,973
3,082	1,320	1,144	2,116	2,422	1,906	2,928	2,856	2,502
1,951	2,265	1,485	1,500	2,446	1,952	1,269	2,989	783
2,692	1,323	1,509	1,549	369	2,070	1,717	910	1,538
1,206	1,760	1,638	2,348	978	2,454	1,797	1,536	2,339
1,342	1,919	1,961	2,498	1,238	1,606	1,955	1,957	2,700
443	2,357	2,127	294	1,818	1,680	2,199	2,240	2,222
754	2,866	2,430	1,115	1,824	1,827	2,482	2,695	2,597
1,621	732	1,704	1,124	1,907	1,915	2,701	1,325	2,742
870	1,464	1,876	1,532	1,938	2,084	3,210	2,250	1,837
1,174	1,626	2,010	1,688	1,940	2,639	377	2,279	2,842
1,412	1,762	2,165	1,822	2,197	842	1,220	2,626	2,434
1,809	1,915	2,231	1,897	2,646	1,963	1,401	1,501	1,640
2,415	2,119	2,389	2,445	1,461	2,059	2,175	1,752	1,821
1,546	1,766	335	2,886	1,731	2,338	1,118	2,058	2,487

Maximum

Minimum

# Langkah-langkah untuk membuat distribusi frekuensi:

1. Tentukan jumlah kelas  $\rightarrow 2^k \rightarrow k = \text{jumlah kelas. } 2^k > \text{jumlah observasi}$
2. Tentukan interval kelas  $\rightarrow \frac{\text{Nilai maksimum} - \text{nilai minimum}}{k}$
3. Tetapkan batasan tiap kelas  $\rightarrow$
4. Masukkan setiap observasi ke dalam kelas dan tentukan jumlah observasi di setiap kelas.



**Step 1: Decide on the number of classes.** A useful recipe to determine the number of classes ( $k$ ) is the “2 to the  $k$  rule.” This guide suggests you select the smallest number ( $k$ ) for the number of classes such that  $2^k$  (in words, 2 raised to the power of  $k$ ) is greater than the number of observations ( $n$ ). In the Applewood Auto Group example, there were 180 vehicles sold. So  $n = 180$ . If we try  $k = 7$ , which means we would use 7 classes,  $2^7 = 128$ , which is less than 180. Hence, 7 is too few classes. If we let  $k = 8$ , then  $2^8 = 256$ , which is greater than 180. So the recommended number of classes is 8.



**Step 2: Determine the class interval.** Generally, the **class interval** is the same for all classes. The classes all taken together must cover at least the distance from the minimum value in the data up to the maximum value. Expressing these words in a formula:

$$i \geq \frac{\text{Maximum Value} - \text{Minimum Value}}{k}$$

where  $i$  is the class interval, and  $k$  is the number of classes.

For the Applewood Auto Group, the minimum value is \$294 and the maximum value is \$3,292. If we need 8 classes, the interval should be:

$$i \geq \frac{\text{Maximum Value} - \text{Minimum Value}}{k} = \frac{\$3,292 - \$294}{8} = \$374.75$$

In practice, this interval size is usually rounded up to some convenient number, such as a multiple of 10 or 100. The value of \$400 is a reasonable choice.



3

**Step 3: Set the individual class limits.** State clear class limits so you can put each observation into only one category. This means you must avoid overlapping or unclear class limits. For example, classes such as “\$1,300–\$1,400” and “\$1,400–\$1,500” should not be used because it is not clear whether the value \$1,400 is in the first or second class. In this text, we will generally use the format \$1,300 up to \$1,400 and \$1,400 up to \$1,500 and so on. With this format, it is clear that \$1,399 goes into the first class and \$1,400 in the second.

4

**Step 4: Tally the vehicle profit into the classes and determine the number of observations in each class.** To begin, the profit from the sale of the first vehicle in Table 2–4 is \$1,387. It is tallied in the \$1,000 up to \$1,400 class. The second profit in the first row of Table 2–4 is \$2,148. It is tallied in the \$1,800 up to \$2,200 class. The other profits are tallied in a similar manner. When all the profits are tallied, the table would appear as:

Profit	Frequency
\$ 200 up to \$ 600	
600 up to 1,000	
1,000 up to 1,400	
1,400 up to 1,800	
1,800 up to 2,200	
2,200 up to 2,600	
2,600 up to 3,000	
3,000 up to 3,400	

Profit	Frequency
\$ 200 up to \$ 600	8
600 up to 1,000	11
1,000 up to 1,400	23
1,400 up to 1,800	38
1,800 up to 2,200	45
2,200 up to 2,600	32
2,600 up to 3,000	19
3,000 up to 3,400	4
Total	180

# Distribusi Frekuensi relatif

Profit	Frequency	Relative Frequency	Found by
\$ 200 up to \$ 600	8	.044	8/180
600 up to 1,000	11	.061	11/180
1,000 up to 1,400	23	.128	23/180
1,400 up to 1,800	38	.211	38/180
1,800 up to 2,200	45	.250	45/180
2,200 up to 2,600	32	.178	32/180
2,600 up to 3,000	19	.106	19/180
3,000 up to 3,400	4	.022	4/180
Total	<u>180</u>	<u>1.000</u>	



# LATIHAN SOAL

## SELF-REVIEW 2-3



Barry Bonds of the San Francisco Giants established a new single-season Major League Baseball home run record by hitting 73 home runs during the 2001 season. Listed below is the sorted distance of each of the 73 home runs.

320	320	347	350	360	360	360	361	365	370
370	375	375	375	375	380	380	380	380	380
380	390	390	391	394	396	400	400	400	400
405	410	410	410	410	410	410	410	410	410
410	410	411	415	415	416	417	417	420	420
420	420	420	420	420	420	429	430	430	430
430	430	435	435	436	440	440	440	440	440
450	480	488							

- For this data, show that seven classes would be used to create a frequency distribution using the  $2^k$  rule.
- Show that a class interval of 30 would summarize the data in seven classes.
- Construct frequency and relative frequency distributions for the data with seven classes and a class interval of 30. Start the first class with a lower limit of 300.
- How many home runs traveled a distance of 360 up to 390 feet?
- What percentage of the home runs traveled a distance of 360 up to 390 feet?
- What percentage of the home runs traveled a distance of 390 feet or more?



4. Menyajikan table frekuensi dengan histogram/polygon

Tiga diagram yang akan membantu menggambarkan **distribusi frekuensi** secara grafis adalah histogram, poligon frekuensi, dan poligon frekuensi kumulatif.

1

**Histogram** untuk distribusi frekuensi berdasarkan data kuantitatif mirip dengan diagram batang yang menunjukkan distribusi data kualitatif

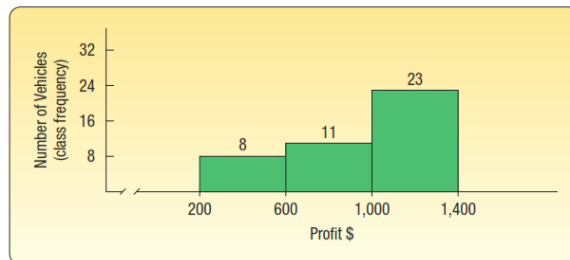


CHART 2-3 Construction of a Histogram

2

**Polygon** → terdiri dari garis yang menghubungkan titik-titik yang dibentuk oleh perpotongan dari titik tengah kelas dan frekuensi kelas.

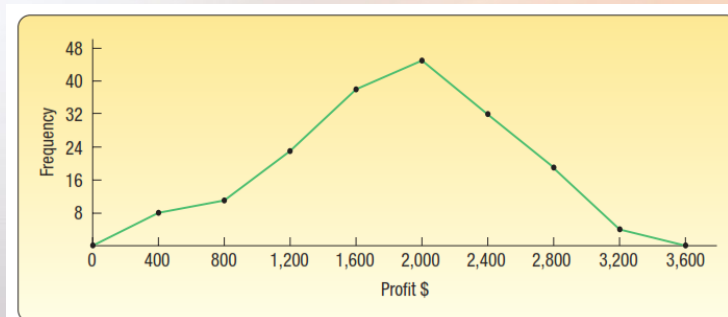


CHART 2-5 Frequency Polygon of Profit on 180 Vehicles Sold at Applewood Auto Group

3

**Polygon Frekuensi kumulatif** → konsep saama seperti polygon,

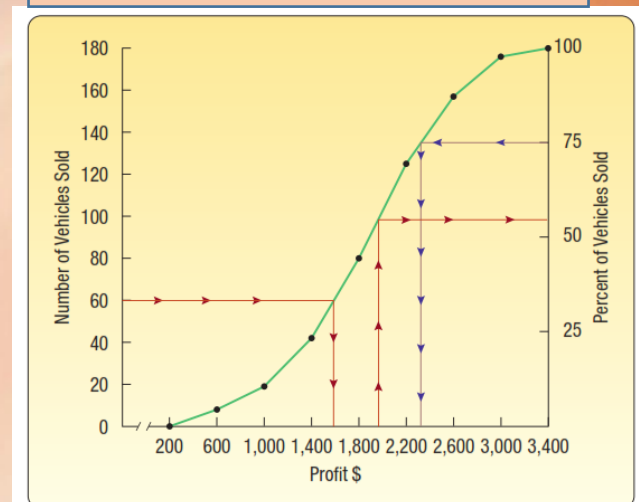


CHART 2-7 Cumulative Frequency Polygon for Profit on Vehicles Sold Last Month at Applewood Auto Group

# CONTOH: histogram

Below is the frequency distribution of the profits on vehicle sales last month at the Applewood Auto Group.

Profit	Frequency
\$ 200 up to \$ 600	8
600 up to 1,000	11
1,000 up to 1,400	23
1,400 up to 1,800	38
1,800 up to 2,200	45
2,200 up to 2,600	32
2,600 up to 3,000	19
3,000 up to 3,400	4
Total	<u>180</u>

Construct a histogram. What observations can you reach based on the information presented in the histogram?

### SOLUTION

The class frequencies are scaled along the vertical axis (Y-axis) and either the class limits or the class midpoints along the horizontal axis. To illustrate the construction of the histogram, the first three classes are shown in Chart 2-3.

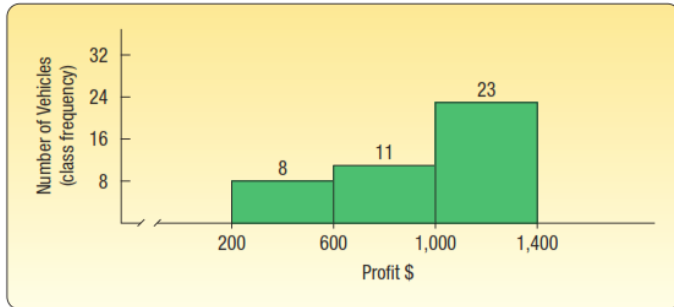


CHART 2-3 Construction of a Histogram

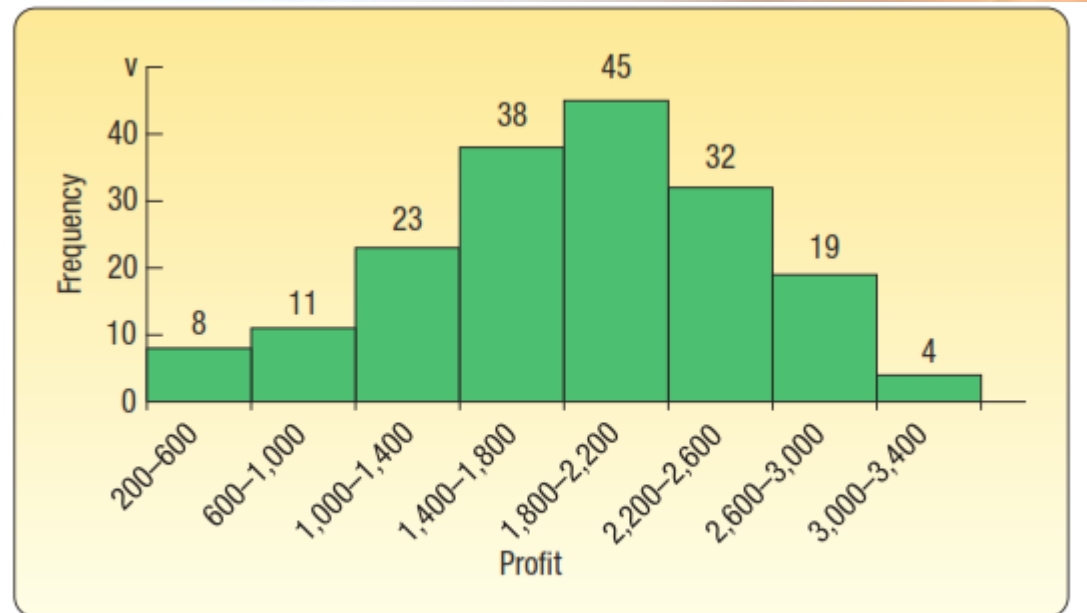
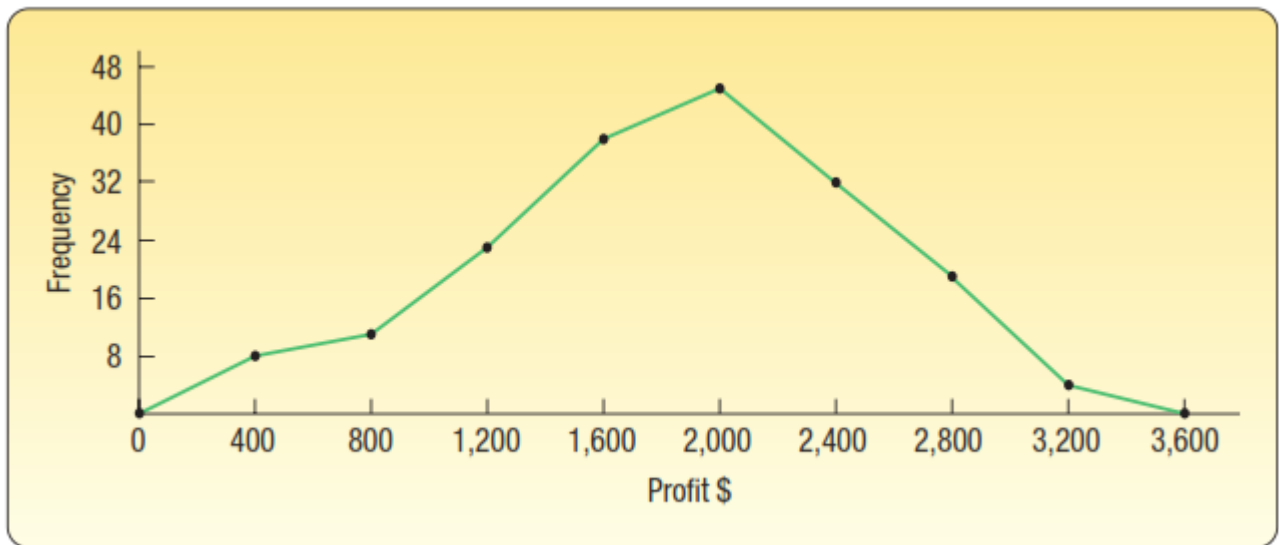


CHART 2-4 Histogram of the Profit on 180 Vehicles Sold at the Applewood Auto Group



# CONTOH: POLYGON 2

Profit	Midpoint	Frequency
\$ 200 up to \$ 600	\$ 400	8
600 up to 1,000	800	11
1,000 up to 1,400	1,200	23
1,400 up to 1,800	1,600	38
1,800 up to 2,200	2,000	45
2,200 up to 2,600	2,400	32
2,600 up to 3,000	2,800	19
3,000 up to 3,400	3,200	4
Total		180





**CHART 2-6** Distribution of Profit at Applewood Auto Group and Fowler Motors

### ③ Distribusi Kumulatif

- Pertimbangkan sekali lagi distribusi keuntungan pada kendaraan yang dijual oleh Applewood Auto Group.
- Misalkan kita tertarik pada jumlah kendaraan yang dijual dengan keuntungan kurang dari \$ 1.400. Atau, misalkan kita tertarik dengan keuntungan yang diperoleh dari penjualan 40% kendaraan terendah.
- Nilai-nilai ini dapat diketahui dengan mengembangkan **distribusi frekuensi kumulatif** dan menggambarkannya secara grafis dalam poligon frekuensi kumulatif.

### EXAMPLE

The frequency distribution of the profits earned at Applewood Auto Group is repeated from Table 2–5.

Profit	Frequency
\$ 200 up to \$ 600	8
600 up to 1,000	11
1,000 up to 1,400	23
1,400 up to 1,800	38
1,800 up to 2,200	45
2,200 up to 2,600	32
2,600 up to 3,000	19
3,000 up to 3,400	4
Total	180

**TABLE 2–8** Cumulative Frequency Distribution for Profit on Vehicles Sold Last Month at Applewood Auto Group

Profit	Cumulative Frequency	Found by	Cumulative Relative Frequency
Less than \$ 600	8	8	$8/180 = 0.044 = 4.4\%$
Less than 1,000	19	$8 + 11$	$19/180 = 0.106 = 10.6\%$
Less than 1,400	42	$8 + 11 + 23$	$42/180 = 0.233 = 23.3\%$
Less than 1,800	80	$8 + 11 + 23 + 38$	$80/180 = 0.444 = 44.4\%$
Less than 2,200	125	$8 + 11 + 23 + 38 + 45$	$125/180 = 0.694 = 69.4\%$
Less than 2,600	157	$8 + 11 + 23 + 38 + 45 + 32$	$157/180 = 0.872 = 87.2\%$
Less than 3,000	176	$8 + 11 + 23 + 38 + 45 + 32 + 19$	$176/180 = 0.978 = 97.8\%$
Less than 3,400	180	$8 + 11 + 23 + 38 + 45 + 32 + 19 + 4$	$180/180 = 1.000 = 100\%$

A hand holding a pen is positioned in the upper right corner of the frame. The background is a light blue and white world map. A semi-transparent grey horizontal bar spans across the middle of the image, containing the text 'LATIHAN SOAL' in blue, bold, uppercase letters. The text has a reflection effect below it.

# LATIHAN SOAL

c. Comment on the shape of the frequency distribution.

30. **FILE** The following data give the weekly amounts spent on groceries for a sample of 45 households.

\$271	\$363	\$159	\$ 76	\$227	\$337	\$295	\$319	\$250
279	205	279	266	199	177	162	232	303
192	181	321	309	246	278	50	41	335
116	100	151	240	474	297	170	188	320
429	294	570	342	279	235	434	123	325

- How many classes would you recommend?
- What class interval would you suggest?
- What would you recommend as the lower limit of the first class?
- Organize the data into a frequency distribution.

42. **FILE** A recent study of home technologies reported the number of hours of personal computer usage per week for a sample of 60 persons. Excluded from the study were people who worked out of their home and used the computer as a part of their work.

9.3	5.3	6.3	8.8	6.5	0.6	5.2	6.6	9.3	4.3
6.3	2.1	2.7	0.4	3.7	3.3	1.1	2.7	6.7	6.5
4.3	9.7	7.7	5.2	1.7	8.5	4.2	5.5	5.1	5.6
5.4	4.8	2.1	10.1	1.3	5.6	2.4	2.4	4.7	1.7
2.0	6.7	1.1	6.7	2.2	2.6	9.8	6.4	4.9	5.2
4.5	9.3	7.9	4.6	4.3	4.5	9.2	8.5	6.0	8.1

- Organize the data into a frequency distribution. How many classes would you suggest? What value would you suggest for a class interval?
- Draw a histogram. Describe your result.



**THANK  
YOU**