



# UKURAN DISPERSI (Penyebaran Data)

---

HIKMATUL KHUSNA, M.PD



# Definisi Ukuran Dispersi

---

Ukuran dispersi adalah data yang menggambarkan bagaimana suatu kelompok data menyebar terhadap pusatnya data atau ukuran penyebaran suatu kelompok data terhadap pusat data

Dispersi

Variasi Data

Keragaman  
Data



# Terdapat 3 Kelompok Data

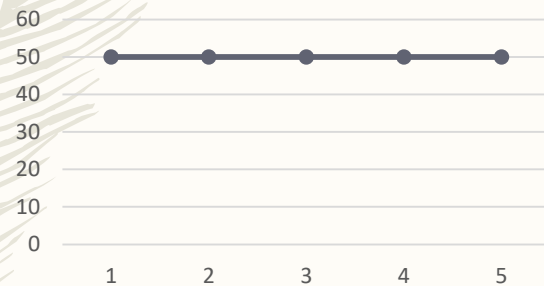
---

|                       | Kelompok 1         | Kelompok 2         | Kelompok 3          |
|-----------------------|--------------------|--------------------|---------------------|
| Data                  | 50, 50, 50, 50, 50 | 50, 40, 30, 60, 70 | 100, 40, 80, 20, 10 |
| $\bar{x}$             | 50                 | 50                 | 50                  |
| Homogen/<br>Heterogen | Homogen            | Heterogen          | Heterogen           |

Data mana yang lebih Heterogen ?

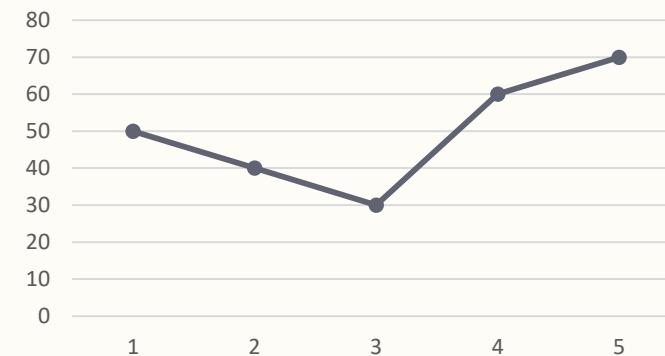
# Grafik Data 1 2 3

Kelompok 1



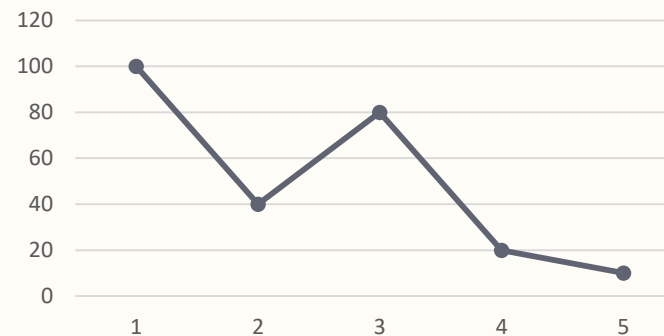
Homogen

Kelompok 2



Relatif Homogen

Kelompok 3



Heterogen



# ALASAN MEMPELAJARI DISPERSI

---

- ❑ Mean dan median hanya menggambarkan pusat data dari sekelompok data, tetapi tidak menggambarkan penyebaran nilai pada data tersebut.
- ❑ Dua kelompok data dengan mean yang sama, belum tentu memiliki penyebaran data yang sama.
- ❑ Ukuran dispersi yang kecil menunjukkan nilai data saling berdekatan (perbedaan kecil), sedangkan ukuran dispersi yang besar menunjukkan nilai data saling menyebar (perbedaan nilai masing-masing data besar).
- ❑ Ukuran dispersi digunakan untuk melengkapi perhitungan nilai pusat data.



# Jenis Ukuran Dispersi

---

## 1. Dispersi Mutlak

Dispersi mutlak digunakan untuk mengetahui tingkat variabilitas nilai-nilai observasi pada suatu data

## 2. Dispersi Relatif

Dispersi relatif digunakan untuk membandingkan tingkat variabilitas nilai-nilai observasi suatu data dengan tingkat variabilitas nilai-nilai observasi data lainnya.





# Jenis Ukuran Dispersi

---

## Dispersi Mutlak

- Rentang
- Simpangan Rata-rata (mean deviasi)
- Simpangan Baku (standar deviasi)
- Varians

## Dispersi Relatif

- Koefisien Varians



# 1. RENTANG (*Range*)

---

- Ukuran dispersi paling sederhana
- Rentang adalah :  
selisih antara nilai terbesar dan nilai terkecil dari data yang telah disusun berurutan





## Tabel Distribusi nilai ujian

---

|           | Nilai ujian |            |
|-----------|-------------|------------|
|           | Kelompok 1  | Kelompok 2 |
|           | 40          | 10         |
|           | 45          | 25         |
|           | 50          | 55         |
|           | 55          | 70         |
|           | 60          | 90         |
| Jumlah    | 250         | 250        |
| Rata-rata | 50          | 50         |
| Range     | 20          | 80         |

Kesimpulan :

1. kelompok 1 punya kepandaian merata
2. kepandaian kelompok 2 sangat bervariasi



# Tabel Distribusi Kelompok

---

| Berat Badan (Kg) | Banyaknya Mahasiswa (f) |
|------------------|-------------------------|
| 60 – 62          | 5                       |
| 63 – 65          | 18                      |
| 66 – 68          | 42                      |
| 69 - 71          | 27                      |
| 72 - 74          | 8                       |

Rentang dengan Nilai Tengah  
 $r = 73 - 61$   
 $r = 12$

Rentang dengan Batas Kelas  
 $r = 74,5 - 59,5$   
 $r = 15$

$r$  = Nilai tengah kelas terakhir – Nilai tengah kelas pertama  
 $r$  = Batas atas kelas terakhir – Batas bawah kelas pertama



## 2. Simpangan Rata-rata

---

- **Definisi**

Simpangan rata-rata adalah jumlah nilai mutlak dari selisih semua nilai dengan nilai rata-rata dibagi dengan banyaknya data.

Rumus

$$SR = \frac{\sum |X_i - \bar{X}|}{n}$$



# Simpangan Rata-rata – Data Tunggal

---

- Contoh

Diketahui data 30, 40, 50, 60, 70.

Tentukan simpangan rata-rata.

- Jawaban

$$\bar{X} = \frac{30 + 40 + 50 + 60 + 70}{5} = 50$$

# Simpangan Rata-rata – Data Tunggal

---

– Simpangan rata-rata

$$SR = \frac{\sum |X_i - \bar{X}|}{n}$$

$$SR = \frac{|30 - 50| + |40 - 50| + |50 - 50| + |60 - 50| + |70 - 50|}{5}$$

$$SR = \frac{60}{5}$$

$$SR = 12$$



# Simpangan Rata-rata – Data Berkelompok

---

$$SR = \frac{\sum f |X_i - \bar{X}|}{\sum f}$$

- SR = simpangan rata-rata
- f = banyaknya frekuensi data
- $\bar{X}$  = rata-rata
- $X_i$  = frekuensi data ke-i



## Simpangan Rata-rata – Data Berkelompok

| Interval Kelas | X  | f             | $ X_i - \bar{X} $ | $f X_i - \bar{X} $ |
|----------------|----|---------------|-------------------|--------------------|
| 9 – 21         | 15 | 3             | 50,92             | 152,76             |
| 22 – 34        | 28 | 4             | 37,92             | 151,68             |
| 35 – 47        | 41 | 4             | 24,92             | 99,68              |
| 48 – 60        | 54 | 8             | 11,92             | 95,36              |
| 61 – 73        | 67 | 12            | 1,08              | 12,96              |
| 74 – 86        | 80 | 23            | 14,08             | 323,84             |
| 87 – 99        | 93 | 6             | 27,08             | 162,48             |
|                |    | $\Sigma = 60$ |                   | $\Sigma = 998,76$  |



# Simpangan Rata-rata – Data Berkelompok

---

– Jawaban

$$SR = \frac{\sum f |X_i - \bar{X}|}{\sum f}$$

$$SR = \frac{998,76}{60}$$

$$SR = 16,646$$



## 3. Simpangan Baku

---

- Standard deviation (simpangan baku) ialah suatu nilai yang menunjukkan tingkat (derajat) variasi kelompok atau ukuran standar penyimpangan dari reratanya.
- Untuk sampel, simpangan bakunya (simpangan baku sampel) disimbolkan dengan  $s$ . Untuk populasi, simpangan bakunya (simpangan baku populasi) disimbolkan  $\sigma$ .
- $s = \sqrt{varians}$



# Simpangan Baku Data Tunggal

---

$$S = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}}$$

$S$  = simpangan baku

$X_i$  = data ke- $i$

$\bar{x}$  = rata-rata sampel

$n$  = banyaknya sampel



# Contoh Simpangan Baku - Data Tunggal

---

Berikut ini adalah sampel nilai mid test statistik 1 dari sekelompok mahasiswa di sebuah universitas. 30, 35, 42, 50, 58, 66, 74, 82, 90, 98. Tentukan simpangan baku dari data di atas!



# Jawaban

| X   | (X - $\bar{x}$ ) | (X - $\bar{x}$ ) <sup>2</sup> | (X) <sup>2</sup> |
|-----|------------------|-------------------------------|------------------|
| 30  | -32,5            |                               |                  |
| 35  | -27,5            |                               |                  |
| 42  | -20,5            |                               |                  |
| 50  | -12,5            |                               |                  |
| 58  | -4,5             |                               |                  |
| 66  | 3,5              |                               |                  |
| 74  | 11,5             |                               |                  |
| 82  | 19,5             |                               |                  |
| 90  | 27,5             |                               |                  |
| 98  | 35,5             |                               |                  |
| 625 |                  |                               |                  |

$$\bar{x} = \frac{X}{n} = \frac{625}{10} = 62,5$$

$$\begin{aligned} s &= \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}} \\ &= \sqrt{\frac{4950,5}{10 - 1}} \\ &= \sqrt{550,056} = 23,45 \end{aligned}$$





# Simpangan Baku – Data Berkelompok

---

## ■ Rumus simpangan baku populasi

$$\sigma = c \sqrt{\frac{\sum_{i=1}^k f_i d_i^2}{N} - \left( \frac{\sum_{i=1}^k f_i d_i}{N} \right)^2}$$

- $\sigma$  = simpangan baku populasi
- $F_i$  = frekuensi kelas ke-i
- $d_i$  = simpangan dari kelas ke-i terhadap titik asal asumsi
- $N$  = banyaknya populasi
- $c$  = besarnya kelas interval




# Contoh Simpangan Baku – Data Berkelompok

---

Modal dari 40 perusahaan (dalam jutaan rupiah) adalah sebagai berikut:

|     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 138 | 164 | 150 | 132 | 144 | 125 | 149 | 157 |
| 146 | 158 | 140 | 147 | 136 | 148 | 152 | 144 |
| 168 | 126 | 138 | 176 | 163 | 119 | 154 | 165 |
| 146 | 173 | 142 | 147 | 135 | 153 | 140 | 135 |
| 161 | 145 | 135 | 142 | 150 | 156 | 145 | 128 |

Tentukan simpangan baku dari data diatas.



| Modal (M)        | Nilai Tengah | Frekuensi (f) |
|------------------|--------------|---------------|
| 118 - 126        | 122          | 3             |
| 127 - 135        | 131          | 5             |
| 136 - 144        | 140          | 9             |
| <b>145 - 153</b> | <b>149</b>   | <b>12</b>     |
| 154 - 162        | 158          | 5             |
| 163 - 171        | 167          | 4             |
| 172 - 180        | 176          | 2             |
| <b>Jumlah</b>    |              | <b>40</b>     |

- Kelas interval sama, yaitu 9 (126 – 118)

# Simpangan Baku – Data Berkelompok

| Kelas     | f  | d  | d <sup>2</sup> | fd                                  | fd <sup>2</sup>                                  |
|-----------|----|----|----------------|-------------------------------------|--|
| 118 - 126 | 3  | -3 | 9              | -9                                  | 27   |
| 127 - 135 | 5  | -2 | 4              | -10                                 | 20   |
| 136 - 144 | 9  | -1 | 1              | -9                                  | 9  |
| 145 - 153 | 12 | 0  | 0              | 0                                   | 0  |
| 154 - 162 | 5  | 1  | 1              | 5                                   | 5  |
| 163 - 171 | 4  | 2  | 4              | 8                                   | 16   |
| 172 - 180 | 2  | 3  | 9              | 6                                   | 18   |
| Jumlah    | 40 | 0  | 28             | Σf <sub>i</sub> d <sub>i</sub> = -9 | Σf <sub>i</sub> d <sub>i</sub> <sup>2</sup> = 95 |

$$\sigma = c \sqrt{\frac{\sum_{i=1}^k f_i d_i^2}{N} - \left( \frac{\sum_{i=1}^k f_i d_i}{N} \right)^2} = 9 \sqrt{\frac{95}{40} - \left( \frac{-9}{40} \right)^2} = 13,72$$



## 4. VARIANS

---

- **Definisi**

Varians adalah ukuran keragaman yang melibatkan seluruh data.

Varians merupakan rata-rata kuadrat selisih dari semua nilai data terhadap nilai rata-rata hitung.

- Varians didasarkan pada perbedaan antara nilai tiap observasi ( $X_i$ ) dan rata-rata ( $\bar{X}$  untuk sampel dan  $\mu$  untuk populasi)
- $V = S^2$



# Menggunakan Excel dalam Analisis Data Statistik Deskriptif

---

- Buka Menu Microsoft Excel lalu pilih Excel Options
- Add-Ins → Analysis ToolPk → lalu klik Go
- Centang Analysis ToolPak lalu klik OK
- Muncul Menu Data Analysis
- Masukkan data pada range
- Pilih menu Data pada menu utama
- Pilih Data Analysis
- Pilih Descriptive Statistics pada Data Analysis, Klik OK



# Statistik Deskriptif dengan Excel

Book1 - Microsoft Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW Nitro PDF Professional Sign in

From Access From Web From Text From Other Sources Existing Connections Refresh All Connections Sort Filter Clear Reapply Advanced Text to Columns Flash Fill Remove Duplicates Data Validation Consolidate What-If Analysis Relationships Group Ungroup Subtotal Data Analysis

G7

|    | A   | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|----|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| 1  | 138 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 2  | 146 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 3  | 168 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 4  | 146 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 5  | 161 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 6  | 164 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 7  | 158 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 8  | 126 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 9  | 173 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 10 | 145 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 11 | 150 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 12 | 140 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 13 | 138 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 14 | 142 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 15 | 135 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 16 | 132 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 17 | 147 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 18 | 176 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 19 | 147 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 20 | 142 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 21 | 144 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 22 | 136 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 23 | 163 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 24 | 135 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 25 | 150 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 26 | 125 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 27 | 148 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 28 | 119 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 29 | 153 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 30 | 156 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 31 | 149 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 32 | 152 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 33 | 154 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 34 | 140 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 35 | 145 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 36 | 157 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 37 | 144 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 38 | 165 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 39 | 135 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 40 | 128 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |

Sheet1 Sheet2

# Soal

Hasil penelitian terhadap hasil produksi padi kering per hektar dalam kuintal di 100 desa tahun 2010 sebagai berikut

|     |     |     |     |    |    |     |    |    |    |
|-----|-----|-----|-----|----|----|-----|----|----|----|
| 71  | 29  | 64  | 118 | 74 | 86 | 53  | 38 | 70 | 64 |
| 48  | 39  | 78  | 72  | 33 | 64 | 41  | 36 | 78 | 58 |
| 60  | 42  | 96  | 48  | 43 | 39 | 63  | 71 | 43 | 69 |
| 39  | 72  | 120 | 102 | 26 | 86 | 39  | 28 | 64 | 61 |
| 78  | 82  | 78  | 96  | 38 | 63 | 71  | 43 | 53 | 86 |
| 56  | 83  | 103 | 64  | 64 | 78 | 96  | 54 | 48 | 50 |
| 112 | 136 | 48  | 73  | 63 | 63 | 123 | 62 | 36 | 58 |
| 108 | 27  | 73  | 42  | 71 | 54 | 28  | 96 | 81 | 63 |
| 67  | 48  | 100 | 62  | 48 | 62 | 71  | 72 | 63 | 71 |
| 83  | 28  | 28  | 43  | 39 | 38 | 36  | 83 | 62 | 60 |

- Buatlah Tabel distribusi frekuensi berdasarkan petunjuk Sturges. Hitunglah nilai jangkauan, simpangan rata-rata, dan standard deviasi.