

14. Statistik Statistics

Tingkatan Satu	Bab 12	: Pengendalian Data / <i>Data Handling</i>
Tingkatan Dua	Bab 12	: Sukatan Kecenderungan Memusat / <i>Measure of Central Tendency</i>
Tingkatan Empat	Bab 8	: Sukatan Serakan Data Tak Berkumpul / <i>Measures of Dispersion for Ungrouped Data</i>
Tingkatan Empat	Bab 7	: Sukatan Serakan Data Berkumpul / <i>Measures of Dispersion for Grouped Data</i>

NOTA RINGKAS

Sukatan Serakan Data Tak Berkumpul / *Measures of Dispersion for Ungrouped Data*

Julat bagi data tak berkumpul = Nilai cerapan terbesar – Nilai cerapan terkecil.

Range of ungrouped data = Largest value – Smallest value

Julat antara kuartil data tak berkumpul = Kuartil ketiga – Kuartil Pertama

Interquartile range of an ungrouped data = Third quartile – First quartile

Bagi set data tak berkumpul dengan N cerapan atau kekerapan f

For a set of ungrouped data with N observations (values) or frequency f

Min / Mean	Varians / Variance	Sisihan piawai / Standard deviation
$\bar{x} = \frac{\sum x}{N}$	$\sigma^2 = \frac{\sum (x - \bar{x})^2}{N}$ $\sigma^2 = \frac{\sum x^2}{N} - \bar{x}^2$	$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}}$ $\sigma = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$
$\bar{x} = \frac{\sum fx}{\sum f}$	$\sigma^2 = \frac{\sum f(x - \bar{x})^2}{\sum f}$ $\sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$	$\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}}$ $\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

Sukatan Serakan Data Berkumpul / Measures of Dispersion for Grouped Data

Julat = Titik tengah bagi kelas tertinggi – Titik tengah bagi kelas terendah

Range = Midpoint for the highest class - Midpoint for the lowest class

Julat antara Kuartil = $Q_3 - Q_1$ (Nilai Q_3 dan Q_1 ditentukan daripada ogif)

Range between Quartiles = $Q_3 - Q_1$ (Values of Q_3 and Q_1 are determined from the ogive)

Varians / Variance, $\sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$

Sisihan Piawai / Standard Deviation, $\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

Contoh 1 / Example 1 :

Jadual di bawah menunjukkan markah kuiz matematik bagi 20 orang murid.

The table below shows the math quiz scores for 20 students.

Markah / Marks	1	2	3	4	5
Bilangan murid / Number of pupils	2	4	8	5	1

- (a) Cari julat antara kuartil bagi data itu.
Find the interquartile range of the data.
- (b) Cari varians bagi data itu.
Find the variance of the data.
- (c) Cari sisihan piawai bagi data itu.
Find the standard deviation of the data.

Jawapan / Answer :

<p>(a) Julat antara kuartil</p> $Q_1 = \text{cerapan ke } - \left(\frac{1}{4} \times 20 \right)$ $= \text{cerapan ke } 5$ $= 2$ $Q_3 = \text{cerapan ke } - \left(\frac{3}{4} \times 20 \right)$ $= \text{cerapan ke } 15$ $= 4$ <p>Julat antara kuartil / <i>Interquartile range</i></p> $= 4 - 2 = 2$	<p>(b) min / <i>mean</i></p> $\bar{x} = \frac{(1 \times 2) + (2 \times 4) + (3 \times 8) + (4 \times 5) + (5 \times 1)}{20}$ $= 2.95$ <p>varians / <i>variance</i></p> $\sigma^2 = \frac{2(1)^2 + 4(2)^2 + 8(3)^2 + 5(4)^2 + 1(5)^2}{20} - 2.95^2$ $= 1.0475$ <p>(c) sisihan piawai / <i>standard deviation</i></p> $\sigma = \sqrt{1.0475}$ $= 1.0235$
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Contoh 2 / Example 2 :

Hitung min, varians dan sisihan piawai bagi data itu. Bundarkan jawapan kepada empat titik perpuluhan.

Calculate the mean, variance and standard deviation for the data. Round off the answers to four decimal places.

Jisim (kg) <i>Mass (kg)</i>	Kekerapan, <i>f</i> <i>Frequency, f</i>	Titik tengah, <i>x</i> <i>Midpoint, x</i>
30 - 34	3	32
35 - 39	2	37
40 - 44	6	42
45 - 49	8	47
50 - 54	4	52
55 - 59	2	57

Jawapan / Answer :

Jisim (kg) <i>Mass (kg)</i>	Kekerapan, <i>f</i> <i>Frequency, f</i>	Titik tengah, <i>x</i> <i>Midpoint, x</i>	x^2	fx	fx^2
30 - 34	3	32	1024	96	3072
35 - 39	2	37	1369	74	2738
40 - 44	6	42	1764	252	10584
45 - 49	8	47	2209	376	17672
50 - 54	4	52	2704	208	10816
55 - 59	2	57	3249	114	6498
	25			1120	51380

min / <i>mean</i>	variens / <i>variance</i>	sisihan piawai / <i>standard deviation</i>
$\bar{x} = \frac{(3 \times 32) + (2 \times 37) + (6 \times 42) + (8 \times 47) + (4 \times 52) + (2 \times 57)}{25}$ $= \frac{1120}{25}$ $= 44.8$	$\sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$ $= \frac{51380}{25} - (44.8)^2$ $= 48.16$	$\sigma = \sqrt{48.16}$ $= 6.9397$

Contoh 3 / Example 3 :

Hitung varians dan sisihan piawai. *Calculate the variance and standard deviation.*

2, 4, 5, 6, 7, 8, 9, 10, 13

Varians / <i>Variance</i>	Sisihan piawai / <i>Standard deviation</i>
$\bar{x} = \frac{2+4+5+6+7+8+9+10+13}{9} = 7.1111$ $\sum x^2 = 2^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2 + 9^2 + 10^2 + 13^2 = 544$ $\sigma^2 = \frac{544}{9} - (7.1111)^2 = 9.8767$	$\sigma = \sqrt{9.8767}$ $= 3.1427$