

Penyelesaian Lengkap

PRAKTIS 8

Praktis Formatif

8.1 Serakan Dispersion

- $m = 1, n = 7$
- $93 - 28 = 65$ markah/marks
- (a)

Kegunaan petrol kumpulan A Petrol consumption of group A (RM)		Kegunaan petrol kumpulan B Petrol consumption of group B (RM)
5	4	0 5
0 0 0	5	0 0 0 0 0 5
5 0 0 0	6	0 0 0 0
0 0 0 0 0	7	0 0 0
0 0 0 0 0 0	8	0 0 0
0	9	0

(b) Kumpulan/Group B:

$$\begin{aligned} \text{Beza/Difference} &= 90 - 40 \\ &= 50 \end{aligned}$$

Kumpulan/Group A:

$$\begin{aligned} \text{Beza/Difference} &= 90 - 45 \\ &= 45 \end{aligned}$$

\therefore Serakan perbelanjaan kumpulan B adalah lebih besar kerana beza cerapan data adalah lebih besar.
The dispersion in group B spending is wider because it has larger difference in value.

- (a) Plot titik A mempamerkan saiz pinggang murid selepas memupuk tabiat bersenam kerana kebanyakan cerapan tertumpu pada bahagian kiri plot titik.
Dot plot A shows the sizes of waist of the students after cultivating the habit of exercise because most of the values are concentrated on the left of the dot plot.
- (b) (i) 27 cm
(ii) 30 cm
- (c) Plot Titik B/Dot plot B

8.2 Sukatan Serakan Measures of Dispersion

1 (a)

Skor/Score	1	2	3	4	5
Bilangan murid Number of students	18	11	8	10	1
Kekerapan longgokan Cumulative frequency	18	29	37	47	48

$$\begin{aligned} \text{(b) } Q_1 &= \text{cerapan ke-}\left(\frac{48}{4}\right)\text{/The }\left(\frac{48}{4}\right)\text{th value} \\ &= \text{cerapan ke-12/The 12th value} = 1 \end{aligned}$$

$$\begin{aligned} Q_3 &= \text{cerapan ke-}\left(\frac{3}{4} \times 48\right)\text{/The }\left(\frac{3}{4} \times 48\right)\text{th value} \\ &= \text{cerapan ke-36/the 36th value} = 3 \\ \text{Julat antara kuartil/Interquartile range} &= 3 - 1 \\ &= 2 \end{aligned}$$

2 (a)

Bilangan kelas tuisyen Number of tuition classes, x	2	3	4	5	6	
Bilangan murid Number of students, f	13	15	8	3	1	$\Sigma f = 40$
fx	26	45	32	15	6	$\Sigma fx = 124$
x^2	4	9	16	25	36	
fx^2	52	135	128	75	36	$\Sigma fx^2 = 426$

(b) Min/mean

$$\begin{aligned} &= \frac{\Sigma fx}{\Sigma f} \\ &= \frac{124}{40} \\ &= 3.1 \end{aligned}$$

$$\begin{aligned} \text{(c) } \frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2 &= \frac{426}{40} - 3.1^2 \\ &= 1.04 \end{aligned}$$

$$\text{(d) } \sqrt{1.04} = 1.020$$

3 (a) $28 - 5 = 23$

(b) $27 - 22 = 5$

(c) Julat antara kuartil adalah lebih sesuai untuk mengukur data di atas kerana wujudnya pencilan, 5.
Interquartile range is more suitable to measure the above data because of the existence of an outlier, 5.

- 4 (a) (i) Sisihan piawai adalah lebih sesuai untuk dijadikan sukatan serakan. Walaupun julat bagi lompatan Fauzi dan Xiang adalah sama, iaitu 0.4 meter, tetapi konsisten lompatan mereka hanya dapat diukur melalui sisihan piawai. *Standard deviation is a more suitable measure of dispersion. Although range between the results of Fauzi and Xiang are the same, which is 0.4 metre, but their consistency can only be measured through standard deviation.*

(ii)

Fauzi	x	x^2
	1	1
	0.6	0.36
	0.8	0.64
	0.9	0.81
	0.8	0.64
	0.7	0.49
Jumlah Total	4.8	3.94

$$\text{Min/Mean} = \frac{4.8}{6} = 0.8$$

$$\text{Varians/Variance} = \frac{3.94}{6} - 0.8^2 = 0.01667$$

$$\text{Sisihan piawai/Standard deviation} = \sqrt{0.01667} = 0.1291$$

Sisihan piawai bagi lompatan Fauzi/Standard deviation for Fauzi's jump = 0.1291

Xiang	x	x^2
	0.7	0.49
	0.6	0.36
	0.6	0.36
	0.8	0.64
	1	1
	0.6	0.36
Jumlah Total	4.3	3.21

$$\text{Min/Mean} = \frac{4.3}{6} = 0.7167$$

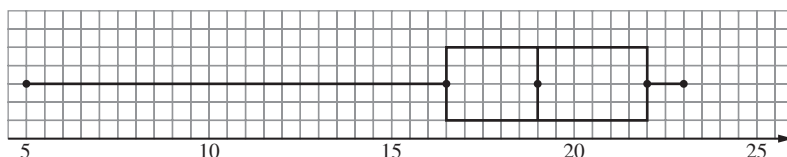
$$\begin{aligned} \text{Varians/Variance} &= \frac{3.21}{6} - 0.7167^2 \\ &= 0.02134 \end{aligned}$$

$$\text{Sisihan piawai/Standard deviation} = \sqrt{0.02134} = 0.1461$$

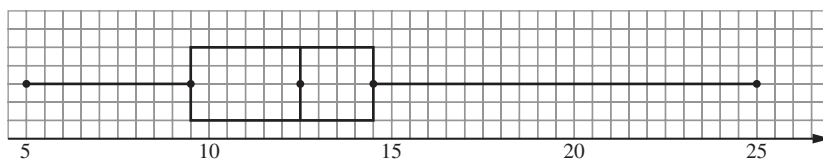
Sisihan piawai bagi lompatan Xiang/Standard deviation for Xiang's jump = 0.1461

- (b) Sisihan piawai bagi lompatan Fauzi adalah lebih rendah kerana lompatannya adalah lebih konsisten. Fauzi harus dipilih untuk mewakili sekolah. *Standard deviation of Fauzi is lower because his results is more consistent. So Fauzi should be chosen to represent the school.*

5 (a)



(b)



- 6 (a) (i) 10
(ii) 50
(iii) 40
(iv) 25
(v) 35
(vi) 10
(vii) 31

- (b) (i) 0.24
(ii) 0.49
(iii) 0.25
(iv) 0.32
(v) 0.44
(vi) 0.12
(vii) 0.35

Sukatan serakan <i>Measure of dispersion</i>	Ditambah dengan 2 <i>Added by 2</i>	Ditolak dengan 2 <i>Subtracted by 2</i>	Didarab dengan 2 <i>Multiplied by 2</i>	Dibahagi dengan 2 <i>Divided by 2</i>
Julat/Range = 6	6	6	$6 \times 2 = 12$	$6 \div 2 = 3$
Julat antara kuartil = 3 <i>Interquartile range</i>	3	3	$3 \times 2 = 6$	$3 \div 2 = 1.5$
Varians/ <i>Variance</i> = 4	4	4	$4 \times 2^2 = 16$	$4 \div 2^2 = 1$
Sisihan piawai = 2 <i>Standard deviation</i>	2	2	$2 \times 2 = 4$	$2 \div 2 = 1$

8 (a)

	x	x^2
	6	36
	6	36
	7	49
	8	64
	9	81
	9	81
	9	81
	11	121
	18	324
Jumlah Total	83	873

$$\text{Min/Mean} = \frac{83}{9} \\ = 9.222$$

$$\text{Varians/Variance} = \frac{873}{9} - 9.222^2 \\ = 11.95$$

(b) $873 - 324 = 549$

$$\text{Min/Mean} = \frac{65}{8} \\ = 8.125$$

$$\text{Varians/Variance} = \frac{549}{8} - 8.125^2 \\ = 2.609$$

$$\text{Sisihan piawai/Standard deviation} = \sqrt{2.609} \\ = 1.615$$

9 Julat/Range = $(38 \div 2) - (17 \div 2)$
 $= 10.5$

$$\text{Varians/Variance} = 7^2 \\ = 49$$

$$\text{Varians baru/New variance} = \frac{49}{2^2} = 12.25$$

10 Julat antara kuartil/*Interquartile range* = 10×3
 $= 30$

$$\text{Sisihan piawai lama/Previous standard deviation} \\ = 1.5811$$

$$\text{Sisihan piawai baharu/New standard deviation} \\ = 1.5811 \times 3 \\ = 4.743$$

11

Joe	x	x^2
	80	6 400
	78	6 084
	90	8 100
	82	6 724
	79	6 241
Jumlah Total	409	33 549

$$\text{Min/Mean, } \bar{x} = \frac{409}{5} \\ = 81.8$$

$$\text{Varians/Variance, } \sigma^2 = \frac{33\,549}{5} - 81.8^2 \\ = 18.56$$

$$\text{Sisihan piawai/Standard deviation, } \sigma = \sqrt{18.56} \\ = 4.308$$

Selvam	x	x^2
	80	6 400
	73	5 329
	68	4 624
	75	5 625
	99	9 801
Jumlah Total	395	31 779

$$\text{Min/Mean, } \bar{x} = \frac{395}{5} \\ = 79$$

$$\text{Varians/Variance, } \sigma^2 = \frac{31\,779}{5} - 79^2 \\ = 114.8$$

$$\text{Sisihan piawai/Standard deviation, } \sigma = \sqrt{114.8} \\ = 10.71$$

Joe mempunyai pencapaian yang lebih konsisten kerana sisihan piawai baginya lebih kecil.

Joe performed more consistently because the standard deviation is smaller.

12 Kumpulan/Group X

$$\frac{4\ 100}{\Sigma f} = 164$$

$$\Sigma f = 25$$

$$\frac{\Sigma x^2}{25} - 164^2 = 2.2$$

$$\Sigma x^2 = 672\ 455$$

Kumpulan /Group Y

$$\frac{5\ 530}{\Sigma f} = 158$$

$$\Sigma f = 35$$

$$\frac{\Sigma y^2}{35} - 158^2 = 2.8$$

$$\Sigma y^2 = 873\ 838$$

$$\begin{aligned} \text{Min bergabung/Combined mean} &= \frac{4\ 100 + 5\ 530}{35 + 25} \\ &= 160.5 \end{aligned}$$

Sisihan piawai bergabung/Combined standard deviation

$$= \sqrt{\frac{672\ 455 + 873\ 838}{60} - 160.5^2}$$

$$= \sqrt{11.3}$$

$$= 3.362$$

13 1, 2, b, 8, a, 24

Julat antara kuartil/Interquartile range = 9

$$a - 2 = 9$$

$$a = 11$$

$$\text{Min/Mean} = \frac{25}{3}$$

$$\frac{1 + 2 + b + 8 + 11 + 24}{6} = \frac{25}{3}$$

$$1 + 2 + b + 8 + 11 + 24 = 50$$

$$b = 4$$

(a) $a = 11, b = 4$

(b)

	x	x^2
	1	1
	2	4
	4	16
	8	64
	11	121
	24	576
Jumlah Total	50	782

$$\text{Min/Mean, } \bar{x} = \frac{50}{6}$$

$$= 8.333$$

$$\text{Sisihan piawai/Standard deviation, } \sigma = \sqrt{\frac{782}{6} - 8.333^2}$$

$$= \sqrt{60.89}$$

$$= 7.803$$

14

	x	x^2
	-2	4
	-1	1
	0	0
	4	16
	6	36
	9	81
Jumlah Total	16	138

$$\begin{aligned} \text{Min/Mean, } \bar{x} &= \frac{16}{6} \\ &= 2.667 \end{aligned}$$

$$\begin{aligned} \text{Sisihan piawai/Standard deviation, } \sigma &= \sqrt{\frac{138}{6} - 2.6667^2} \\ &= \sqrt{15.89} \\ &= 3.986 \end{aligned}$$

Praktis Sumatif

Kertas 1

1 B 2 D 3 A 4 D 5 A

6 C 7 D

Kertas 2

Bahagian/Section A

1 (a) Varians/Variance = 2

$$\frac{132}{y} - \left(\frac{36}{y}\right)^2 = 2$$

$$\frac{132}{y} - \frac{1\ 296}{y^2} = 2$$

$$132y - 2y^2 - 1\ 296 = 0$$

$$2y^2 - 132y + 1\ 296 = 0$$

$$(y - 54)(2y - 24) = 0$$

$y = 54$ (Ditolak/rejected) atau/ or $y = 12$ (Diterima/accepted)

Oleh itu/Therefore, $y = 12$.

(b) 30 ialah pencilan. Apabila nilai yang jauh daripada min ditambahkan, sisihan piawai baharu menjadi semakin besar.

30 is an outlier. When the value that has a greater difference from mean is added, the new standard deviation will be larger.

2 (a) Julat antara kuartil/Interquartile range = x

$$\text{Varians/Variance} = \frac{y}{9}$$

(b) Julat antara kuartil/Interquartile range = $\frac{9x}{2}$

$$\text{Varians/Variance} = \frac{9y}{4}$$

Bahagian/Section B

3

Data set Set of data	Julat Range	Julat antara kuartil Interquartile range	x	y
$x, 3, 4, 5, 8, 9, y, 10$	8	5.5	$10 - x = 8$ $x = 2$	$\frac{9 + y}{2} - \frac{3 + 4}{2} = 5.5$ $y = 9$
$y, x, 10, 13, 15, 20, 21, 22, 24$	$24 - 7 = 17$	$\frac{21 + 22}{2} - \frac{8 + 10}{2} = 12.5$	8	7
$x, 4, 5, 6, 6, 7, 7, y, 8, 8$	5	3	$8 - x = 5$ $x = 3$	$y - 5 = 3$ $y = 8$
$25, 25, 27, 28, 28, 31, 33, x, y$	13	7.5	$\frac{33 + x}{2} - \frac{25 + 27}{2} = 7.5$ $x = 34$	$y - 25 = 13$ $y = 38$

4 (a)

	x	f	fx	fx^2
	300	1	300	90 000
	400	5	2 000	800 000
	500	16	8 000	4 000 000
	600	6	3 600	2 160 000
	700	2	1 400	980 000
Jumlah Total	2 500	30	15 300	8 030 000

$$\text{Min/Mean, } \bar{x} = \frac{15\,300}{30} = 510$$

$$\begin{aligned} \text{Sisihan piawai/Standard deviation, } \sigma &= \sqrt{\frac{8\,030\,000}{30} - 510^2} \\ &= \sqrt{7\,566.667} \\ &= 86.99 \end{aligned}$$

(b) Julat antara kuartil/Interquartile range

$$\begin{aligned} \text{(c) } \frac{\sum x}{31} &= 500 \\ \sum x &= 15\,500 \\ \text{RM}15\,500 - \text{RM}15\,300 &= \text{RM}200 \end{aligned}$$

5 (a) **Tina**

$$\begin{aligned} \text{Min/Mean, } \bar{x} &= \frac{567}{6} \\ &= 94.5 \end{aligned}$$

$$\begin{aligned} \text{Varians/Variance, } \sigma^2 &= \frac{53\,713}{6} - 94.5^2 \\ &= 21.92 \end{aligned}$$

Joey

$$\begin{aligned} \text{Min/Mean, } \bar{x} &= \frac{283.5}{6} \\ &= 47.25 \end{aligned}$$

$$\begin{aligned} \text{Varians/Variance, } \sigma^2 &= \frac{13\,428.58}{6} - 47.25^2 \\ &= 5.479 \end{aligned}$$

(b) Berdasarkan varians yang dihitung, didapati bahawa varians markah Tina adalah 4 kali

daripada varians markah Joey. Jadi, markah Joey adalah separuh daripada markah Tina. Based on the variance, the variance of Tina's marks is 4 times the variance of Joey's marks. Thus, Joey's marks is half of that of Tina's marks.

Bahagian/Section C

6

Panjang/Length(cm)	1	2	3	4	5	6
Bilangan serangga Number of insects	4	20	10	9	5	2
Kekerapan Longgokan Cumulative frequency	4	24	34	43	48	50

$$\begin{aligned} \text{(a) Julat/Range} &= 6 \text{ cm} - 1 \text{ cm} \\ &= 5 \text{ cm} \end{aligned}$$

$$\begin{aligned} Q1 &= \frac{50}{4} \\ &= \text{nilai ke-12.5/12.5th value} \\ &= 2 \text{ cm} \end{aligned}$$

$$\begin{aligned} Q3 &= \frac{3}{4} \times 50 \\ &= \text{nilai ke-37.5/37.5th value} \\ &= 4 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Julat antara kuartil/Interquartile range} &= 4 \text{ cm} - 2 \text{ cm} \\ &= 2 \text{ cm} \end{aligned}$$

	x	f	fx	fx^2
	1	4	4	4
	2	20	40	80
	3	10	30	90
	4	9	36	144
	5	5	25	125
	6	2	12	72
Jumlah Total	21	50	147	515

$$\begin{aligned}\text{Min/Mean, } \bar{x} &= \frac{147}{50} \\ &= 2.94\end{aligned}$$

$$\begin{aligned}\text{Varians/Variance, } \sigma^2 &= \frac{515}{50} - 2.94^2 \\ &= 1.6564 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Sisihan piawai/Standard deviation, } \sigma &= \sqrt{1.6564} \\ &= 1.287 \text{ cm}\end{aligned}$$

(b) Julat/Range = 50 mm

Julat antara kuartil/*Interquartile range* = 20 mm

Varians/*Variance* = 165.6 mm²

Sisihan piawai/*Standard deviation* = 12.87 mm

(c) Semua kekal sama seperti dalam 6(a).

All remain the same as in 6(a).

(d) Julat antara kuartil/*Interquartile range*