

:

تمثيل سلسلة إحصائية بيانيا
تلخيص سلسلة إحصائية بواسطة مؤشرات
التموقع و مؤشرات التشتت و تفسير ذلك
تلخيص سلسلة إحصائية بواسطة مخطط بعلة



: - I

:

(x_1, x_2, \dots, x_n)

$x_1 < x_2 < \dots < x_n$:

: Q_1 (1)

Q_1

x_i

. Med

:

(2)

: Q_3

(3)

x_i

Q_3

$[Q_1, Q_3]$:

-

:

(4)

:

$$Q_1 = a_i + \frac{\frac{n}{4} - S}{E_i} \times h_i \quad : \quad (1)$$

n :

: a_i

: S

: h_i

: E_i

. Med : (2

$$Q_3 = a_i + \frac{\frac{3n}{4} - S}{E_i} \times h_i : (3$$

: n

$$\frac{3n}{4}$$

: a_i

: S

: h_i

: E_i

: (4

- II

:

$$: D_1 \quad (1)$$

$$. D_1 \quad \frac{1}{10} \quad x_i$$

$$: D_9 \quad (2)$$

$$. D_9 \quad \frac{9}{10} \quad x_i$$

:

$$D_1 = a_i + \frac{\frac{n}{10} - S}{E_i} \times h_i \quad : D_1 \quad (1)$$

$$D_9 = a_i + \frac{\frac{9n}{10} - S}{E_i} \times h_i \quad : D_9 \quad (2)$$

: 1

	6	9	12	14	16	18
	8	10	10	6	4	2

$$n = 2 + 4 + 6 + 10 + 10 + 8 \quad : \quad n = 40 \quad *$$

$$10 \quad : \quad Q_1 \quad \frac{n}{4} = 10 \quad *$$

$$Q_1 = 9 \quad :$$

$$30 \quad : \quad Q_3 \quad \frac{3n}{4} = 30 \quad *$$

$$Q_3 = 14 \quad :$$

$$4 \quad : \quad D_1 \quad \frac{n}{10} = 4 \quad *$$

$$D_1 = 6 \quad :$$

$$36 \quad D_9 \quad \frac{9n}{10} = 36 \quad *$$

$$D_9 = 16 \quad :$$

$$[9 ; 14] \quad :$$

$$: 2$$

$$: 80$$

	[120 ; 130[	[130 ; 140[	[140 ; 150[
	10	15	12

[150 ; 160[	[160 ; 170[	[170 ; 180]
10	13	20

$$. D_9, D_1, Q_3, Q_1 \quad -$$

$$Q_1 = a_i + \frac{\frac{n}{4} - S}{E_i} \times h_i : Q_1 -$$

$$[130 ; 140[: \quad \frac{n}{4} = 20 :$$

$$E_i = 15 \quad a_i = 130 :$$

$$S = 10 \quad h_i = 140 - 130 = 10$$

$$Q_1 \approx 137 : \quad Q_1 = 130 + \frac{20 - 1}{15} \times 10 :$$

$$Q_3 = a_i + \frac{\frac{3n}{4} - S}{E_i} \times h_i : Q_3 -$$

$$[160 ; 170[: \quad \frac{3n}{4} = 60 :$$

$$h_i = 170 - 160 = 10 ; \quad E_i = 13 ; \quad a_i = 160 :$$

$$S = 10 + 12 + 15 + 10 = 47$$

$$Q_3 = 170 \quad Q_3 = 160 + \frac{60 - 47}{13} \times 10 :$$

$$D_1 = a_i + \frac{\frac{n}{10} - S}{E_i} \times h_i : D_1 -$$

$$: \quad \frac{n}{10} = 8 :$$

$$h_i = 130 - 120 = 10 : \quad [120 ; 130[$$

$$S = 0 ; \quad E_i = 10 ; \quad a_i = 120$$

$$D_1 = 128 : \quad D_1 = 120 + \frac{8 - 0}{10} \times 10 :$$

$$D_9 = a_i + \frac{\frac{9n}{10} - S}{E_i} \times h_i : D_9 -$$

$$[170;180[: \frac{9n}{10} = 72 :$$

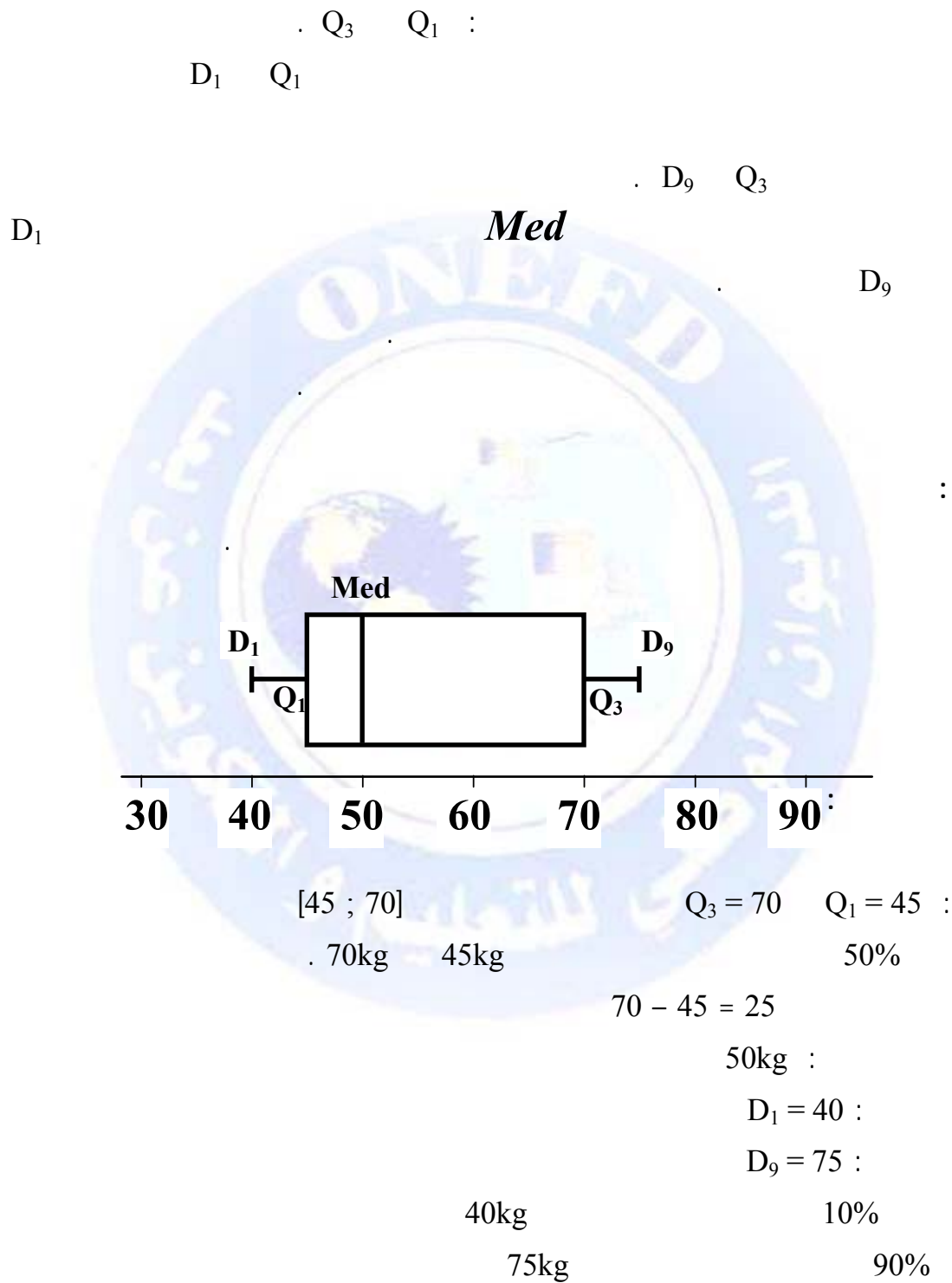
$$h_i = 180 - 170 = 10 ; E_i = 20 ; a_i = 170 :$$

$$S = 13 + 10 + 12 + 15 + 10 = 60$$

$$D_9 = 179 : D_9 = 170 + \frac{72 - 60}{20} \times 10 :$$

$$[137 ; 170] : [Q_1 , Q_3] : -$$

: - III



: - IV

: (1

(x_1, x_2, \dots, x_n)

\bar{x}

$$S_m = \frac{|x_1 - \bar{x}| + |x_2 - \bar{x}| + \dots + |x_n - \bar{x}|}{n}$$

:

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10

130 ; 130 ; 140 ; 150 ; 150 ; 150
160 ; 165 ; 165 ; 170 .

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$$\bar{x} = \frac{130 \times 2 + 140 + 150 \times 3 + 160 + 165 \times 2 + 170}{10}$$

$$\bar{x} = 151 \quad ; \quad \bar{x} = \frac{1510}{10} \quad ;$$

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$$S_m = \frac{2|130 - 151| + |140 - 151| + 3|150 - 151| + |160 - 151|}{10}$$

$$S_m = \frac{2 \times 21 + 11 + 3 \times 1 + 9 + 2 \times 14 + 19}{10} + \frac{2|165 - 151| + |170 - 151|}{10}$$

$$S_m = 11,2$$

(2

*

$$V = \frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n}$$

\bar{x}

$S_x :$

*

$$S_x = \sqrt{V}$$

$$V = \frac{2(130 - 151)^2 + (140 - 151)^2 + 3(150 - 151)^2 + (160 - 151)^2}{10} + \frac{2(165 - 151)^2 + (170 - 151)^2}{10}$$

$$V = \frac{2(21)^2 + (11)^2 + 3(1)^2 + 9^2 + 2(14)^2 + (19)^2}{10} = \frac{2(441) + 121 + 3(81) + 2(196) + 361}{10} = \frac{1840}{10}$$

$$V = 184$$

$$S_x = \sqrt{V}$$

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$$S_x = \sqrt{184} \quad , \quad S_x \approx 13,56$$

$$: I_Q \quad (3)$$

$$I_Q = Q_3 - Q_1 :$$

:

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$$\frac{10}{4} = 2,5 : 10$$

$$Q_1 = 140 : 3 \quad Q_1$$

$$10 \times \frac{3}{4} = 7,5 :$$

$$Q_3 = 165 : 8 \quad Q_3$$

$$I_Q = Q_3 - Q_1 = 165 - 140 = 25 :$$

$$a, b :$$

$$(x_1, x_2, \dots, x_n) \quad S_x : (1)$$

$$(y_1, y_2, \dots, y_n) \quad S_y$$

$$1 \leq i \leq n \quad y_i = a x_i + b :$$

$$S_y = |a| \times S_x :$$

$$(x_1, x_2, \dots, x_n) \quad S_m : (2)$$

$$(y_1, y_2, \dots, y_n) \quad S'_m$$

$$1 \leq i \leq n \quad y_i = a x_i + b :$$

$$S'_m = |a| \cdot S_m :$$

$$\bar{x} \quad (x_1, x_2, \dots, x_n) \quad (3)$$



تمارين و مشكلات

1

50 48 36 31 30 25 20 16 15 14 13 8 5 4 3 :

. 110 100 98 96 90 80 78 70 64 60

. Q_3 Q_1 (1)

. I_Q (2)

. D_9 D_1 (3)

. **Med** (4)

2

3

	05	05	06	02	02	02	02
	15	12	08	10	06	07	05
	08	12	13	16	12	06	05
	10	18	14	07	05	14	09

$$\frac{15 + 12 + 8 + 10 + 6 + 7 + 5}{7} = 9 : \quad (1)$$

9

: (2)

$$\frac{5(-2) + 5(2) + 6(3) + 2(6) + 2(2) + 2(-4) + 2(-5)}{7} = \frac{16}{7} ; 2,28$$

10,28 8 + 2,28 :

3

	150	155	160	165	170	180	185	190
	10	15	30	05	12	10	08	10

-1

-2

(-3

	[145;155[[155;165[[165;175[[175;185[[185;195[

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4

85000 DA

80

55000 DA

220

. 25000 DA

5

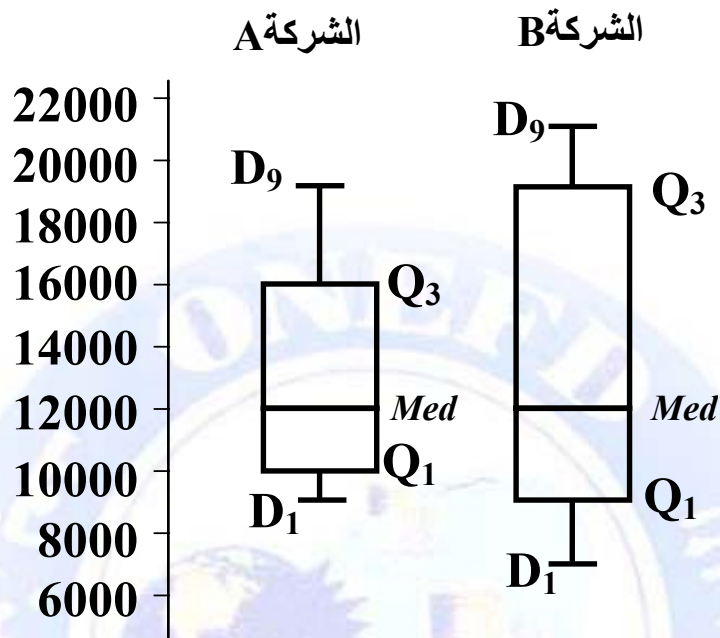
100

	4	6	8	9	10	12	13	16	17
	10	15	10	5	35	5	10	5	5

(1

(2

(3



2 4 6 8 8 8 8 8 10 10 12 12 12 12 8 6 4 2 2 2

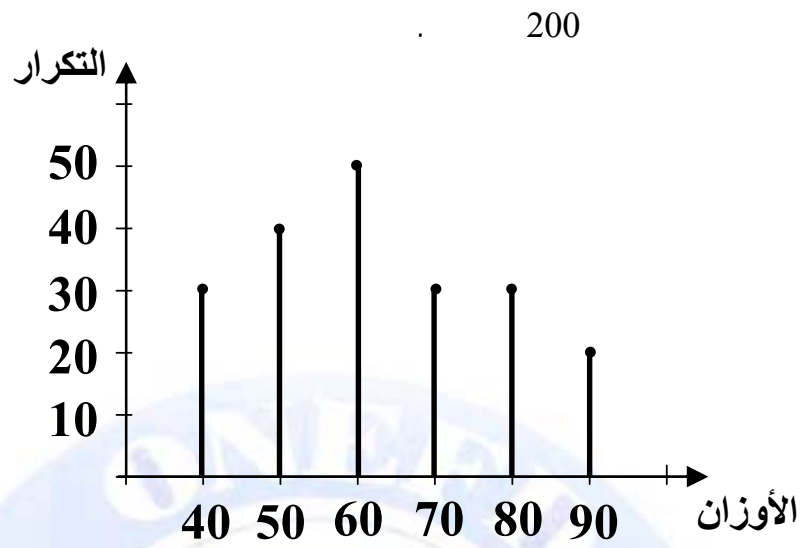
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-1

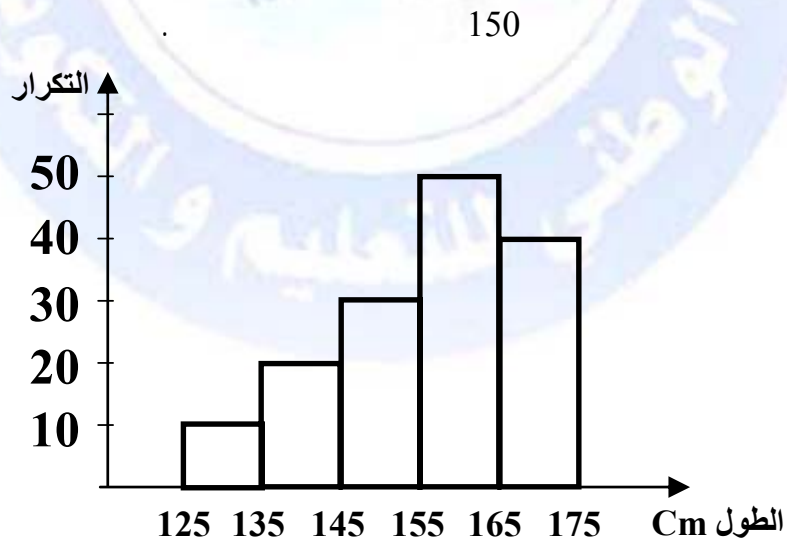
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-3

-4



- 1
- 2
- 3
- 4

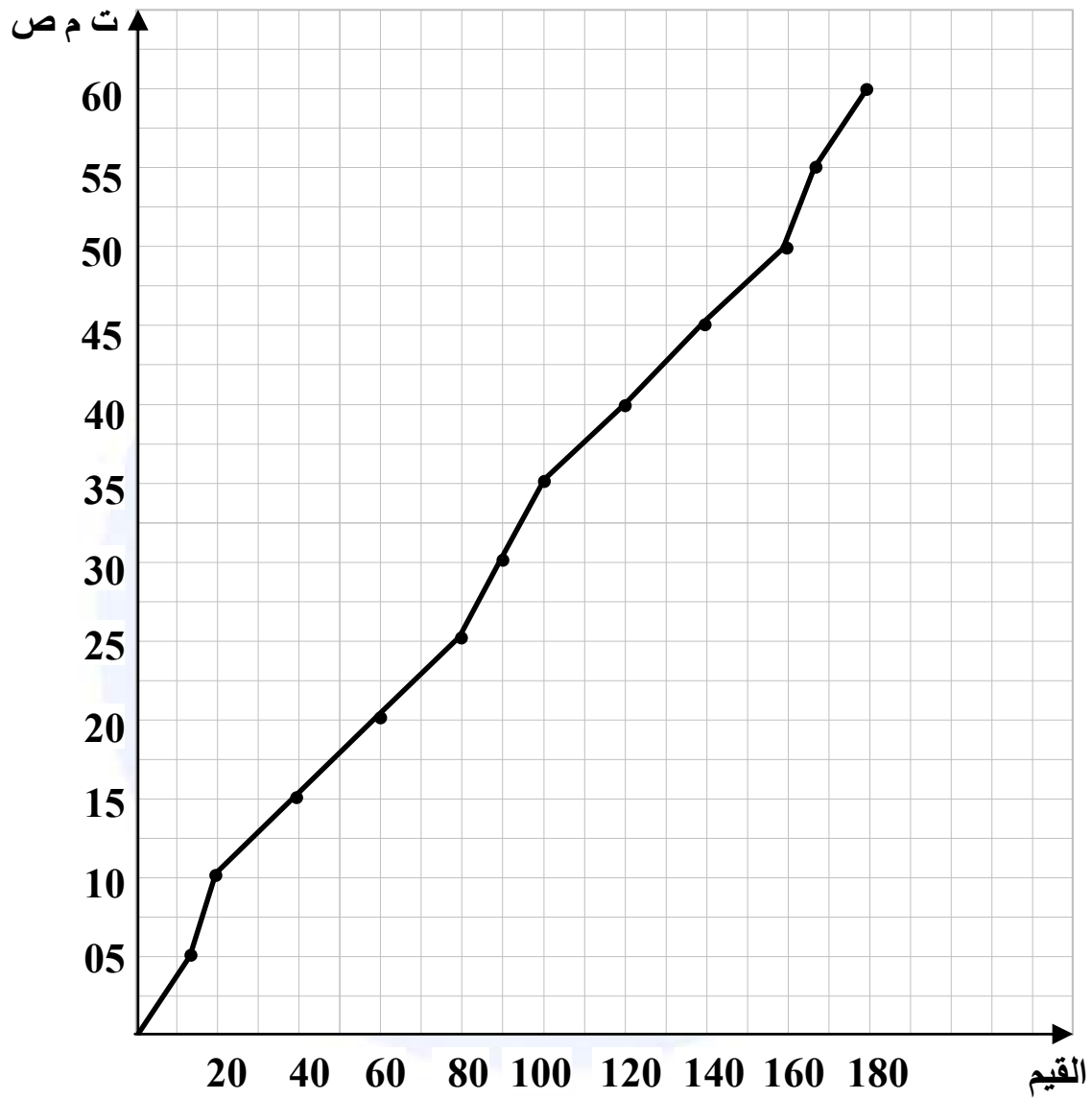


- 1
- 2
- 3
- 4
- 5

. D_1 D_9

-6

10



-1

. Q_3 Q_1

-2

. D_9 D_1

-3

11

:

	10	20	30	40	50	60
	15	5	5	10	3	2

(1)

. D_9 D_1 Q_3 Q_1 (2)

(3)

12

:

1100

(h)	0,5	1	1,5	2	2,5	3
	100	50	200	100	150	500

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-

$$1$$

$$Q_1 \quad 25 : Q_1 - (1)$$

$$7 \quad Q_1 \quad \frac{25}{4}$$

$$Q_1 = 15 : 15 \quad Q_1$$

$$25 \times \frac{3}{4} \quad Q_3 : Q_3 -$$

$$Q_3 = 78 : 19 \quad Q_3$$

$$[15 ; 78] :$$

$$I_Q = Q_3 - Q_1 = 78 - 15 : (2)$$

$$I_Q = 63 :$$

$$D_1 \quad \frac{25}{10} \quad D_1 : D_1 - (3)$$

$$D_1 = 5 : 3$$

$$25 \times \frac{9}{10} \quad D_9 : D_9 -$$

$$D_9 = 98 : 23 : D_9$$

$$Med \quad 25 : Med (4)$$

$$13 \quad Med \quad \frac{25}{2}$$

$$Med = 36 :$$

$$2$$

$$: (1)$$

$$\bar{x} = \frac{5 \times 15 + 5 \times 12 + 6 \times 8 + 6 \times 10 + 2 \times 10 + 2 \times 6 + 2 \times 7 + 2 \times 5}{24}$$

$$\bar{x} \approx 12,46 : \bar{x} = \frac{299}{24} :$$

(2)

$$y_i = x_i + 10 \quad :$$

$$8 = -2 + 10$$

$$12 = 2 + 10$$

$$13 = 3 + 10$$

$$16 = 6 + 10$$

$$6 = -4 + 10$$

$$5 = -5 + 10$$

$$\bar{y} = \bar{x} + 10 \quad :$$

:

$$\bar{x} = \frac{(-2) \times 5 + 2 \times 5 + 3 \times 6 + 6 \times 2 + 2 \times 2 + (-4) \times 2 + (-5) \times 2}{7}$$

$$\bar{x} \approx 2,28 + 10$$

$$\bar{y} = 2,28 + 10 \quad :$$

$$\bar{y} \approx 12,28 \quad :$$

: (3)

$$y_i = x_i + 10 \quad :$$

$$18 = 8 + 10$$

$$14 = 4 + 10$$

$$7 = (-3) + 10$$

$$10 = 0 + 10$$

$$5 = (-5) + 10$$

$$14 = (-4) + 10$$

$$9 = (-1) + 10$$

$$\bar{y} = \bar{x} + 10 \quad :$$

$$\bar{x} = \frac{5 \times 0 + 5 \times 8 + 6 \times 4 + 2(-3) + 2(5) + 2 \times 4 + 2(-1)}{7}$$

$$\bar{x} = \frac{40 + 24 - 6 + 10 + 8 - 2}{24} = \frac{74}{24}$$

$$\bar{x} \approx 3,01$$

$$\bar{y} = 13,01 \quad :$$

$$\bar{y} = 3,01 + 10 \quad : \\ 13,01$$

3

$$\bar{x} = \frac{150 \times 10 + 155 \times 15 + 160 \times 30 + 165 \times 5 + 170 \times 12}{100} + \frac{180 \times 10 + 175 \times 8 + 190 \times 10}{100}$$

$$\boxed{\bar{x} = 165,9} : \quad \bar{x} = \frac{16590}{100}$$

$$50 \quad \frac{100}{2} : \quad ($$

$$. \text{Med} = 160 : \quad ($$

$$\text{Mod} = 160 : \quad ($$

$$: \quad (2$$

$$E = 190 - 140 = 50 : \quad ($$

$$: \quad ($$

$$S_m = \frac{10|150 - 165,9| + 15|155 - 165,9| + 30|160 - 165,9|}{100} + \frac{5|165 - 165,9| + 12|170 - 165,9| + 10|180 - 165,9|}{100} + \frac{8|185 - 165,9| + 10|190 - 165,9|}{100}$$

$$S_m = \frac{10 \times 15,9 + 15 \times 10,9 + 30 \times 5,9 + 12 \times 4,1 + 10 \times 14,1}{100} + \frac{8 \times 19,1 + 10 \times 24,1}{100}$$

$$S_m = \frac{159 + 163,5 + 177 + 4,5 + 49,2 + 141 + 152,8 + 241}{100}$$

$$S_m = 10,88$$

$$: \quad ($$

$$: \quad *$$

$$V = \frac{10(150 - 165,9)^2 + 15(155 - 165,9)^2 + 30(160 - 165,9)^2}{100} + \frac{5(16 - 165,9)^2 + 12(170 - 165,9)^2 + 10(180 - 165,9)^2}{100} + \frac{8(185 - 165,9)^2 + 10(190 - 165,9)^2}{100}$$

$$V = \frac{10 \times 252,81 + 15 \times 118,81 + 30 \times 34,81 + 5 \times 0,81}{100} + \frac{12 \times 16,81 + 10 \times 198,81 + 8 \times 364,81 + 10 \times 580,81}{100}$$

$$V = \frac{2528,1 + 1782,15 + 1044,3 + 4,05}{100} + \frac{201,72 + 2918,48 + 5808,1}{100}$$

$$\boxed{V \approx 136,9} : \quad V = \frac{13686,9}{100}$$

$$S_x = \sqrt{V} : \quad *$$

$$\boxed{S_x \approx 11,7} :$$

: (3

	[145;155[	[155;165[	[165;175[	[175;185[	[185;195[
	10	45	17	10	18
	150	160	170	180	190

: *

$$\bar{x} = \frac{150 \times 10 + 160 \times 45 + 170 \times 17 + 180 \times 10 + 190 \times 18}{100}$$

$$\boxed{\bar{x} \approx 168} :$$

$$\bar{x} = \frac{16810}{100}$$

$$Med = a_i + \frac{\frac{n}{2} - S}{E_i} \times h_i \quad :$$

$$[155 ; 165[\quad \frac{n}{2} = 50 \quad n = 100 :$$

$$a_i = 155 ; h_i = 165 - 155 = 10 ; S = 10 ; E_i = 45 :$$

$$Med = 155 + \frac{50 - 10}{45} \times 10 \quad :$$

$$\boxed{Med \approx 163,9} \quad :$$

$$Mod = a_i + \frac{D_1}{D_1 + D_2} \times h_i \quad :$$

$$[155 ; 165[\quad :$$

$$a_i = 155 ; h_i = 165 - 155 = 10 ; D_2 = 45 - 17 = 28 :$$

$$D_1 = 45 - 10 = 35$$

$$\boxed{Mod \approx 160,5} \quad : \quad Mod = 155 + \frac{35}{35+28} \times 10 :$$

$$E = 195 - 145 = 50 \quad : \quad - ($$

$$: \quad -$$

$$S_m = \frac{10 |150 - 168| + 45 |160 - 168| + 17 |170 - 168|}{100}$$

$$+ \frac{10 |180 - 168| + 18 |190 - 168|}{100}$$

$$\boxed{S_m \approx 10,9} \quad : \quad S_m = \frac{180 + 36 + 34 + 120 + 396}{100}$$

$$V = \frac{10 (150 - 168)^2 + 45 (160 - 168)^2 + 17 (170 - 168)^2}{100} + \frac{10 (180 - 160)^2 + 18 (190 - 168)^2}{100}$$

$$V = \frac{3240 + 2880 + 68 + 1440 + 8712}{100}$$

$$V = 163,4 \quad ; \quad V = \frac{16340}{100}$$

$$S_x = \sqrt{V} = \sqrt{163,4} \quad ; \quad *$$

$$S_x \approx 12,8 \quad ;$$

$$\bar{x} = \frac{80 \bar{x}_1 + 100 \bar{x}_2 + 220 \bar{x}_3}{400} \quad ; \quad *$$

$$\bar{x} = \frac{80 \times 85000 + 100 \times 55000 + 220 \times 25000}{400}$$

$$\bar{x} = \frac{6800000 + 5500000 + 5500000}{400}$$

$$\bar{x} = 44500$$

44500 DA

$$\bar{x} = \frac{4 \times 10 + 6 \times 15 + 8 \times 10 + 9 \times 5 + 10 \times 35}{100}$$

$$\bar{x} = \frac{4 \times 10 + 6 \times 15 + 8 \times 10 + 9 \times 5 + 10 \times 35}{100}$$

$$+ \frac{12 \times 5 + 13 \times 10 + 16 \times 5 + 17 \times 5}{100}$$

$$\bar{x} = \frac{40 + 90 + 80 + 45 + 350 + 60 + 130 + 80 + 85}{100}$$

$$\bar{x} = 9,6 \quad : \quad \bar{x} = \frac{960}{100}$$

:

$$S_m = \frac{10|4 - 9,6| + 15|6 - 9,6| + 10|8 - 9,6| + 5|9 - 9,6|}{100}$$

$$+ \frac{35|10 - 9,6| + 5|13 - 9,6| + 5|16 - 9,6| + 5|17 - 9,6|}{100}$$

$$S_m = \frac{10 \times 5,6 + 15 \times 3,6 + 10 \times 1,6 + 5 \times 0,6 + 35 \times 0,4}{100}$$

$$+ \frac{5 \times 2,4 + 10 \times 3,4 + 5 \times 6,4 + 5 \times 7,4}{100}$$

$$S_m = \frac{56 + 54 + 16 + 3 + 14 + 12 + 34 + 32 + 37}{100}$$

$$S_m = \frac{258}{100} = 2,58$$

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-3

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$$V = \frac{10(4 - 9,6)^2 + 15(6 - 9,6)^2 + 10(8 - 9,6)^2 + 5(9 - 9,6)^2}{100}$$

$$+ \frac{35(10 - 9,6)^2 + 5(12 - 9,6)^2 + 10(13 - 9,6)^2}{100}$$

$$+ \frac{5(16 - 9,6)^2 + 5(17 - 9,6)^2}{100}$$

$$V = \frac{10 \times 31,36 + 15 \times 12,96 + 10 \times 2,56 + 5 \times 0,36}{100} + \frac{5 \times 5,76 + 10 \times 31,36 + 15 \times 12,96 + 10 \times 2,56}{100} + \frac{5 \times 0,36 + 5 \times 5,76 + 10 \times 10,56 + 5 \times 40,96 + 5 \times 54,76}{100}$$

$$V = \frac{313,6 + 195,4 + 25,6 + 1,8 + 28,8 + 115,6}{100} + \frac{204,8 + 273,8}{100}$$

$$V \approx 11,6$$

$$V = \frac{1158,4}{100}$$

:

$$S_x = \sqrt{v} \quad ; \quad S_x \approx 3,4$$

$$I_Q = Q_3 - Q_1 \quad : \quad -4$$

$$25 \quad Q_1 \quad \frac{100}{4} = 25 \quad Q_1 \quad : Q_1 \quad *$$

$$Q_1 = 6 \quad :$$

$$75 \quad Q_3 \quad 100 \times \frac{3}{4} = 75 \quad Q_3 \quad : Q_3 \quad *$$

$$I_Q = 4 \quad : \quad I_Q = 10 - 6 \quad : \quad Q_3 = 10 \quad :$$

. 6

:

. 12000 DA

50 % : A

. 1000

50% : **B**

. 6000

9000 DA

25 % : **B**

1000

25 % : A

7000 DA

10 % : B

7000 DA

10 % : A

21000 DA

10 % : B

19000 DA

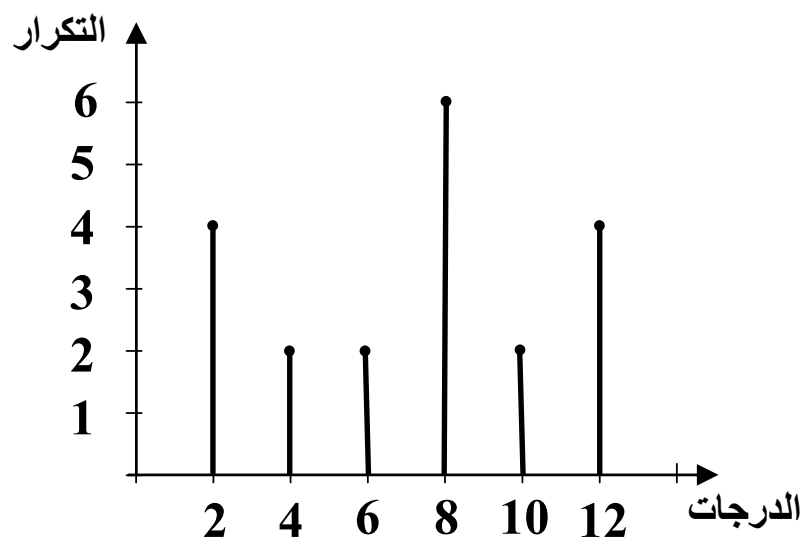
10 % : A

7

: (1)

		2	4	6	8	10	12	
		4	2	2	6	2	4	
		0,2	0,1	0,1	0,3	0,1	0,2	
	0	4	6	8	14	16	20	
		20	16	14	12	6	4	0

: (2)



: (3)

: (

$$\bar{x} = \frac{2 \times 4 + 4 \times 2 + 6 \times 2 + 8 \times 6 + 10 \times 2 + 12 \times 4}{20}$$

$$\bar{x} = \frac{144}{20}$$

$$\bar{x} = \frac{8 + 8 + 12 + 48 + 20 + 48}{20}$$

$$\boxed{\bar{x} = 7,2}$$

$$Med = \frac{a_{\frac{n}{2}} + a_{\frac{n}{2}+1}}{2} : \quad : \quad ($$

$$\frac{n}{2} = 10 : \quad n = 20 :$$

$$a_{\frac{n}{2}} = 8 : 10$$

$$a_{\frac{n}{2}}$$

$$a_{\frac{n}{2}+1} = 8 : 11$$

$$a_{\frac{n}{2}+1}$$

$$Med = 8 :$$

$$Mod = 8 : \quad (\rightarrow$$

$$5 \quad \frac{n}{4} \quad Q_1 \quad - : \quad ($$

$$Q_1 = 4$$

$$15 \quad \frac{3n}{4} : \quad Q_3 \quad -$$

$$Q_3 = 10 :$$

$$: \quad (4$$

$$E = 12 - 2 = 10 : \quad ($$

$$: \quad ($$

$$S_m = \frac{4 |2 - 7,2| + 2 |4 - 7,2| + 2 |6 - 7,2| + 6 |8 - 7,2|}{20} + \frac{2 |10 - 7,2| + 4 |12 - 7,2|}{20}$$

$$S_m = \frac{4 \times 5,2 + 2 \times 3,2 + 2 \times 1,2 + 6 \times 0,8 + 2 \times 2,8 + 4 \times 4,8}{20}$$

$$S_m = \frac{20,8 + 6,4 + 2,4 + 4,8 + 5,6 + 19,2}{20} = \frac{59,2}{20}$$

$$S_m = 2,96$$

$$V = \frac{4 (2 - 7,2)^2 + 2 (4 - 7,2)^2 + 2 (6 - 7,2)^2 + 6 (8 - 7,2)^2}{20} + \frac{2 (10 - 7,2)^2 + 4 (12 - 7,2)^2}{20}$$

$$V = \frac{4 (5,2)^2 + 2 (3,2)^2 + 2 (1,2)^2 + 6 (0,8)^2 + 4 (4,8)^2}{20} = \frac{108,16 + 20,48 + 2,88 + 3,84 + 15,68 + 92,16}{20}$$

$$V = 12,16 \quad V = \frac{243,2}{20}$$

$$S_x \approx 3,5 \quad S_x = \sqrt{V} \quad I_Q = Q_3 - Q_1 \quad I_Q = 10 - 4$$

8

	40	50	60	70	80	90
	30	40	50	30	30	20

$$\begin{aligned}\bar{x} &= \frac{40 \times 30 + 50 \times 40 + 60 \times 50 + 70 \times 30 + 80 \times 30 + 90 \times 20}{200} \\ &= \frac{1200 + 2000 + 3000 + 2100 + 2400 + 1800}{200}\end{aligned}$$

$$\bar{x} = 62,5 \quad ; \quad \bar{x} = \frac{12500}{200} \quad ; \quad (2)$$

$$\begin{aligned}V &= \frac{30 (40 - 62,5)^2 + 40 (50 - 62,5)^2 + 50 (60 - 62,5)^2}{200} \\ &+ \frac{30 (70 - 62,5)^2 + 30 (80 - 62,5)^2 + 20 (90 - 62,5)^2}{200}\end{aligned}$$

$$V = \frac{15187,5 + 6250 + 312,5 + 1687,5 + 9187,5 + 15125}{200}$$

$$V = 238,75 \quad ; \quad V = \frac{47750}{200} \quad ;$$

$$S \approx 15,5 \quad ; \quad S = \sqrt{V} = \sqrt{238,75} \quad ; \quad : Q_3 \quad Q_1 \quad -3$$

$$Q_1 = 50 \quad ; \quad \frac{200}{4} = 50 \quad Q_1 \quad \bullet$$

$$Q_3 = 70 \quad ; \quad \frac{3 \times 200}{4} = 150 \quad Q_3 \quad \bullet$$

$$I_Q = Q_3 - Q_1 = 70 - 50 \quad ; \quad -4$$

$$I_Q = 20 \quad ;$$

9

(1)

[125 ; 135[	10	130
[135 ; 145[	20	140
[145 ; 155[	30	150
[155 ; 165[	50	160
[165 ; 175[	40	170

: (2)

$$\bar{x} = \frac{10 \times 130 + 20 \times 140 + 30 \times 150 + 50 \times 160 + 40 \times 170}{150}$$

$$= \frac{1300 + 2800 + 4500 + 8000 + 6800}{150}$$

$$\bar{x} = 156 \quad ; \quad \bar{x} = \frac{23400}{150} \quad ;$$

: (3)

$$V = \frac{10 (130 - 156)^2 + 20 (140 - 156)^2 + 30 (150 - 156)^2}{150}$$

$$+ \frac{50 (160 - 156)^2 + 40 (170 - 156)^2}{150}$$

$$V = \frac{6760 + 5120 + 1080 + 800 + 7840}{150}$$

$$V = 144 \quad ; \quad V = \frac{21600}{150} \quad ;$$

: •

$$S_x = 12 \quad ; \quad S_x = \sqrt{V} = \sqrt{144} \quad ;$$

: (4)

$$\frac{n}{4} = \frac{150}{4} \quad Q_1 = a_i + \frac{\frac{n}{4} - S}{E_i} \times h_i \quad *$$

$$[145 ; 155[\quad : \quad \frac{n}{4} = 37,5 :$$

$$S = 20 + 10 = 30 \quad ; \quad E_i = 30 \quad ; \quad a_i = 145 \quad :$$

$$: \quad h_i = 155 - 145 = 10$$

$$. \quad Q_1 = 147,5 \quad : \quad Q_1 = 145 + \frac{37,5 - 30}{30} \times 10$$

$$\frac{3n}{6} = 112,5 \quad Q_3 = a_i + \frac{\frac{3n}{6} - S}{E_i} \times h_i \quad *$$

$$: \quad [165 ; 175[\quad :$$

$$S = 50 + 30 + 20 + 10 \quad ; \quad E_i = 40 \quad ; \quad a_i = 165$$

$$: \quad h_i = 175 - 165 = 10 \quad ; \quad S = 110 \quad :$$

$$Q_3 = 165,625 \quad : \quad Q_3 = 165 + \frac{112,5 - 110}{40} \times 10$$

$$: \quad -5$$

$$I_Q = 165,625 - 147,5 \quad : \quad I_Q = Q_3 - Q_1 \quad :$$

$$. \quad I_Q = 18,125 \quad :$$

$$: \quad -6$$

$$\frac{n}{10} = 15 \quad D_1 = a_i + \frac{\frac{n}{10} - S}{E_i} \times h_i \quad \bullet$$

$$: \quad [135 ; 145[\quad :$$

$$h_i = 145 - 135 = 10 \quad ; \quad S = 10 \quad ; \quad E_i = 20 \quad ; \quad a_i = 135$$

$$D_1 = 137,5 \quad : \quad D_1 = 135 + \frac{15 - 10}{20} \times 10 \quad :$$

$$\frac{9n}{10} = 135 \quad D_9 = a_i + \frac{\frac{9n}{10} - S}{E_i} \times h_i \cdot$$

$$: [165 ; 175[:$$

$$h_i = 175 - 165 = 10, S = 110 ; E_i = 40, a_i = 165$$

$$. D_9 = 171,25 : D_9 = 165 + \frac{135 - 110}{40} \times 10 :$$

$$. 10$$

$$: (1)$$

$$. M_e = 90 : \frac{n}{2} = 30 : n = 60 :$$

$$: Q_3 \quad Q_1 (2)$$

$$. Q_1 = 40 : \frac{n}{4} = 15 :$$

$$. Q_3 = 120 : \frac{3n}{4} = 45$$

$$: D_9 \quad D_1 (3)$$

$$D_1 = 12 : \frac{n}{10} = 6 :$$

$$D_9 = 168 : \frac{9n}{10} = 54$$

$$. 11$$

$$(1)$$

		10	20	30	40	50	60	
		15	5	5	10	3	2	
		0,375	0,125	0,125	0,25	0,075	0,05	
http://www.oncf.edu.dz	0	15	20	25	35	38	40	

		40	25	20	15	5	2	0
	0	0,375	0,50	0,625	0,875	0,95	1	
		1	0,625	0,5	0,375	0,125	0,05	0

: - (2)

$$\bar{x} = \frac{10 \times 15 + 20 \times 5 + 30 \times 5 + 40 \times 10 + 50 \times 3 + 60 \times 2}{40}$$

$$= \frac{150 + 100 + 150 + 400 + 150 + 120}{40}$$

$$\bar{x} = 26,75 \quad ; \quad \bar{x} = \frac{1070}{40}$$

40

$$Med = \frac{a_{\frac{n}{2}} + a_{\frac{n}{2}+1}}{2}$$

$$\frac{n}{2} = 20 \quad ; \quad n = 40$$

$$a_{\frac{n}{2}} = 20 \quad ; \quad 20 \quad a_{\frac{n}{2}}$$

$$a_{\frac{n}{2}+1} = 21 \quad ; \quad 21 \quad a_{\frac{n}{2}+1}$$

$$Med = 25$$

$$Med = \frac{20 + 30}{2}$$

$$Mod = 10 \quad ; \quad -$$

$$: Q_3 \quad Q_1 \quad -$$

$$Q_3 = 40 : \quad \frac{3n}{4} = 30 \quad ; \quad Q_1 = 10 \quad \frac{n}{4} = 10$$

$$D_1 = 10 : \quad \frac{n}{10} = \frac{40}{10} = 4$$

$$D_9 = 50 : \quad \frac{9n}{10} = 36$$

$$E = 60 - 10 = 50 : \quad \begin{matrix} * \\ * \end{matrix} (3)$$

$$S_m = \frac{15 |10 - 26,75| + 5 |20 - 26,75| + 5 |30 - 26,75|}{40} + \frac{10 |40 - 26,75| + 3 |50 - 26,75| + 2 |60 - 26,75|}{40}$$

$$S_m = \frac{251,25 + 33,75 + 16,25 + 132,5 + 69,75 + 66,5}{40}$$

$$S_m = 14,25 :$$

$$S_m = \frac{570}{40}$$

$$V = \frac{15(10 - 26,75)^2 + 5(20 - 26,75)^2 + 5(30 - 26,75)^2}{40} + \frac{10(40 - 26,75)^2 + 3(50 - 26,75)^2 + 2(60 - 26,75)^2}{40}$$

$$V = \frac{4208,4375 + 227,8125 + 52,8125 + 1755,625}{40} + \frac{1621,6875 + 2211,125}{40}$$

$$V \approx 251,9$$

$$V = \frac{10077,5}{40}$$

$$S_x = \sqrt{V}$$

$$S_x \approx 15,9 :$$

$$I_Q = 30 \quad : \quad I_Q = 40 - 10$$

12

$$\text{Med} = \frac{a_{\frac{n}{2}} + a_{\frac{n}{2}+1}}{2} :$$

$$\frac{n}{2} = 550 \quad : \quad N = 1100$$

$$a_{\frac{n}{2}} = 2,5 \quad : \quad 550 \quad a_{\frac{n}{2}}$$

$$a_{\frac{n}{2}+1} = 2,5 \quad : \quad 550 \quad a_{\frac{n}{2}}$$

$$\text{Med} = 2,5 :$$

$$Q_1 = 1,5 \quad : \quad 275 \quad Q_1 \quad \frac{n}{4} = 275 :$$

$$Q_3 = 3 \quad : \quad 825 \quad Q_3 \quad \frac{3n}{4} = 825 :$$

$$I_Q = Q_3 - Q_1 :$$

$$I_Q = 1,5 \quad : \quad I_Q = 3 - 1,5$$

: V

$$V = \frac{100(0,5 - 2,5)^2 + 50(1 - 2,5)^2 + 200(1,5 - 2,5)^2}{1100} + \frac{100(2 - 2,5)^2 + 150(2,5 - 2,5)^2 + 500(3 - 2,5)^2}{1100}$$

$$V = \frac{400 + 112,5 + 200 + 25 + 0 + 125}{1100}$$

$$V = \frac{862,5}{1100} :$$

$$V \approx 0,8 :$$

$$S_x = \sqrt{V} :$$

$$S_x \approx 9 :$$

