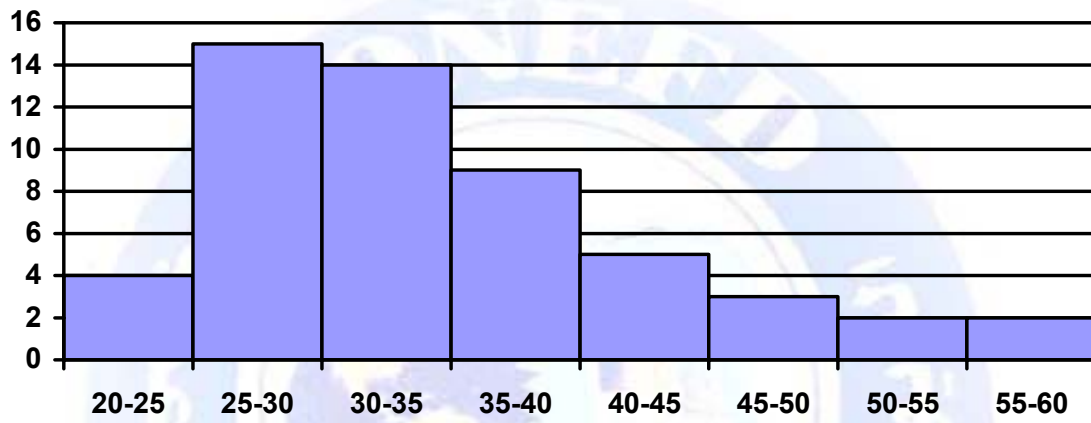


: 01

(a)



(a)

(a)



(b)

	$[20,25[$	$[25,35[$	$[35,45[$	$[45;60[$

(b)

ب-

.4 $[20,25[$

" "

1

(a)

	[20,25[	[25,30[	[30,35[	[35,40[
	4	13	12	9

	[40,45[	[45,50[	[50,55[	[55,60[
	5	3	2	2

(b)

	[20,25[	[25,35[	[35,45[	[45,60[
	4	25	14	7

Q_4, Q_3, Q_2, Q_1 -

[45,60[[35,45[[25,30[[20,25[

h_4, h_3, h_2, h_1

- R_3, R_2, R_2, R_1

R_4, R_3, R_2, R_1

$h_4(60 - 45), h_3(45 - 35), h_2(35 - 25), h_1(25 - 20)$ -

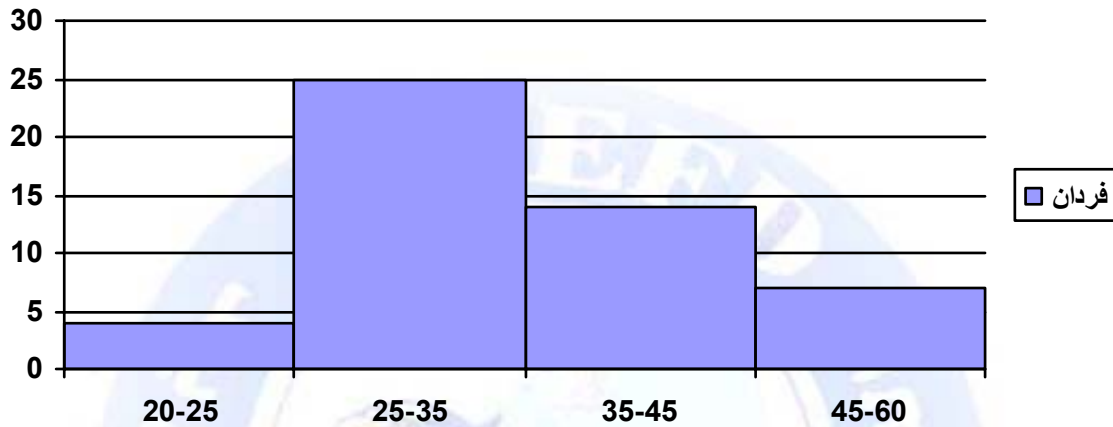
$$\frac{h_4(25 - 20)}{4} = \frac{h_3(35 - 25)}{25} = \frac{h_2(45 - 35)}{14} = \frac{h_1(60 - 45)}{7}$$

$$(h_1 = 4 :) \frac{4.5}{4} = \frac{10h_2}{25} = \frac{10h_3}{14} = \frac{15h_4}{7} :$$

$$h_2 = 25 \times \frac{5}{10}, h_3 = 14 \times \frac{5}{10}, h_4 = 7 \times \frac{5}{10} :$$

$$h_2 = \frac{25}{2} \quad h_3 = 7 \quad h_4 = \frac{7}{3} :$$

:



R_4 7 R_3 12,5 R_2 2 R_1

$$\frac{3,5}{7} = \frac{7}{14} = \frac{12,5}{25} = \frac{2}{4} : \quad 3,5$$

: ¶

l_1, l_2, l_3, l_4

C_4, C_3, C_2, C_1

C_1

n_4, n_3, n_2, n_1

C_i

h_i

$$h_i = n_i \times \frac{l_1}{l_i} :$$

:2

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6-7-7-8-8-8-9-9-9-10-10-11-11-11-13-13-14-16 :

.5-8-13-11-11-11-15-12-12-14-14-15 :

①

\bar{x}

\bar{y}

\bar{x}

②

③

1,25

④

⋮

①

(x_i)	6	7	8	9	10	11	13	14	16
(n_i)	1	2	3	3	2	3	2	1	1
(f_i)	$\frac{1}{18}$	$\frac{2}{18}$	$\frac{3}{18}$	$\frac{3}{18}$	$\frac{2}{18}$	$\frac{3}{18}$	$\frac{2}{18}$	$\frac{1}{18}$	$\frac{1}{18}$

⋮ -

	5	8	11	12	13	14	15
	1	1	3	2	1	2	2
	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{3}{12}$	$\frac{2}{12}$	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{2}{12}$

⋮ -

	5	6	7	8	9	10
	1	1	2	4	3	2
	$\frac{1}{30}$	$\frac{1}{30}$	$\frac{2}{30}$	$\frac{4}{30}$	$\frac{3}{30}$	$\frac{2}{30}$
	11	12	13	14	15	16

	6	2	3	3	2	1
	$\frac{6}{30}$	$\frac{2}{30}$	$\frac{3}{30}$	$\frac{3}{30}$	$\frac{2}{30}$	$\frac{1}{30}$

:

$$\bar{x} = \frac{n_1 x_1 + n_2 x_2 + \dots + n_p x_p}{n_1 + n_2 + \dots + n_k}$$

$$\bar{x} = \frac{1.6 + 2.7 + 3.8 + 3.9 + 2.10 + 3.11 + 2.13 + 1.14 + 1.16}{1 + 2 + 3 + 3 + 2 + 3 + 2 + 1 + 1} :$$

() $\bar{x} = 10$:

$$\bar{x} = 10,7 \quad \bar{y} = 11,75 :$$

\bar{x}

③

$$\bar{x}' = \frac{1(6+2) + 2(7+2) + 3(8+2) + 3(9+2) + 2(10+2) + 3(11+2) + 2(13+2) + 1(14+2) + 1(16+2)}{18}$$

$$\bar{x}' = \frac{1.6 + 2.7 + 3.8 + 3.9 + 2.10 + 3.11 + 2.13 + 1.14 + 1.16 + 2(1+2+3+3+2+3+2+1+1)}{18}$$

$$\bar{x}' = 12 : \quad \bar{x}' = \bar{x} + 2$$

$$\bar{y}' = 1,25 \quad \text{④}$$

$$\bar{y}' = \frac{1(1,25 \times 5) + 1(1,25 \times 8) + 3(1,25 \times 11) + 2(1,25 \times 12) + 1(1,25 \times 13) + 2(1,25 \times 14) + 2(1,25 \times 15)}{18}$$

$$\bar{y}' = 1,25 \left(\frac{1.5 + 1.8 + 3.11 + 2.12 + 1.13 + 2.14 + 2.15}{18} \right) :$$

$$\bar{y}' = 14,6875 : \quad \bar{y}' = 1,25 \times \bar{y} :$$

:

$$\frac{18}{12} \quad \frac{10}{11,75} \quad \text{①}$$

$$\frac{12}{12+18} \quad \frac{11,75}{10,7}$$

$$10,7 = \frac{12 \cdot 11,75 + 18 \cdot 10}{12 + 18} :$$

$$\frac{1 \cdot 25 \cdot (2 + \dots)}{1 \cdot 25} \dots$$

$$\bar{x} = \frac{1.6 + 2.7 + 3.8 + 3.9 + 2.10 + 3.11 + 2.13 + 1.14 + 1.16}{18}$$

$$\bar{x} = \frac{1}{18} \cdot 6 + \frac{2}{18} \cdot 7 + \frac{3}{18} \cdot 8 + \frac{3}{18} \cdot 9 + \frac{2}{18} \cdot 10 + \frac{3}{18} \cdot 11 + \frac{2}{18} \cdot 13 + \frac{1}{18} \cdot 14 + \frac{1}{18} \cdot 16 :$$

$$\bar{x} = f_1 \cdot x_1 + f_2 \cdot x_2 + \dots + f_p \cdot x_p (\dots)$$

:3

B A

165-167-168-171-174-175 : A

168-169-169-170-171-173 : B

\bar{y} A

\bar{x}

. B

$$: V_y V_x$$

$$V_x = \frac{1(165 - \bar{x})^2 + 1(167 - \bar{x})^2 + 1(168 - \bar{x})^2 + 1(171 - \bar{x})^2 + 1(174 - \bar{x})^2 + 1(175 - \bar{x})^2}{6}$$

$$V_y = \frac{1(168 - \bar{y})^2 + 2(169 - \bar{y})^2 + 1(170 - \bar{y})^2 + 1(171 - \bar{y})^2 + 1(173 - \bar{y})^2}{6}$$

$$\bar{x} = 170 \quad \bar{y} = 170 : (\dots)$$

$$\text{http://www.ohfz} \quad V_x \approx 13,33 \quad V_y \approx 2,67 : \quad V_x = \frac{40}{3} \quad V_y = \frac{8}{3}$$

"(\bar{x} A) " V_x
 "(\bar{y} B) " V_y
 A V_y V_x

B

B

A

: ¶

$\sqrt{V_x}$ A V_x

$\sqrt{V_y}$ V_y A

. B

:4

:

35

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	10	11	11	11	12	12	13	13	14	14
	32	32	35	36	37	38	38	38	40	41
17	17	20	23	24	25	27	6			
42	46	46	46	47	50	50				

4

50%

"me"

me

①

"me

25%

"Q₁"

Q₁

②

"Q₁

75%

Q₃"

Q₃

"Q₃

:

me

①

35

me = 30 : 18

me

$$35 \times \frac{75}{100}$$

35

75%

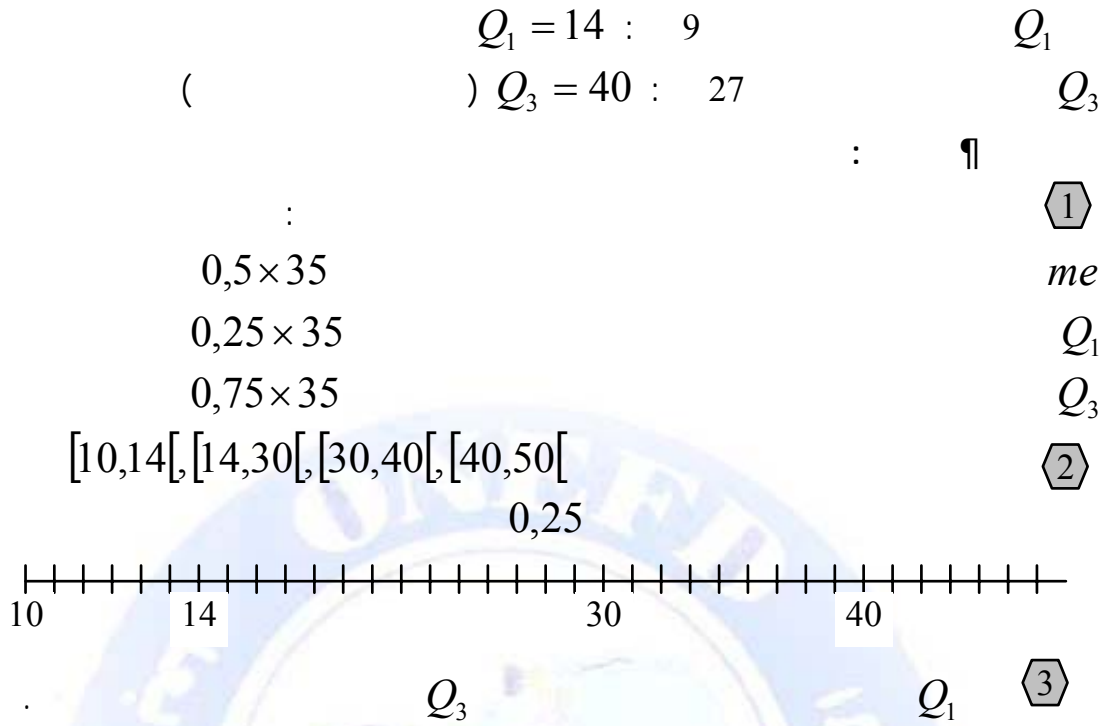
8,75

$$35 \times \frac{25}{100}$$

35

25%

②



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" "

C_1, C_2, \dots, C_p

()

$R_1 R_2, \dots, R_p$

$R_1 R_2, \dots, R_p$ C_1, C_2, \dots, C_p

$R_1 R_2, \dots, R_p$ C_1, C_2, \dots, C_p

" "

: -ب

C_1, C_2, \dots, C_p n_1, n_2, \dots, n_p C_1, C_2, \dots, C_p

C_1, C_2, \dots, C_p l_1, l_2, \dots, l_p

:

$l_1 = l_2 = \dots = l_p$ *
 C_1 n_i C_i
 l_k C_k : *
 n_i C_i l_i) $h_i = n_i \times \frac{l_k}{l_i}$: " " C_i
 C_i (C_i)



- :1 ¶
- :2 ¶
- ...

24 :

	[0,5[	[5,9[	[9,12[	[12,18[
	5	8	7	4

: $l_3 = 12 - 9$: l_3 [9,12[C_3

$l_3 = 3$

$h_i = n_i \times \frac{3}{l_i}$

(C_i)	[0,5[	[5,9[	[9,12[	[12,18[
(l_i)	5 - 0 = 5	9 - 5 = 4	12 - 9 = 3	18 - 12 = 6

$$\begin{aligned}
 & \bar{x} = f_1 x_1, f_2 x_2, \dots, f_p x_p : 1 \\
 & \alpha : 2 \\
 & (\bar{x} + \alpha) \quad (x_1 + \alpha, n_1), (x_2 + \alpha, n_2), \dots, (x_p + \alpha, n_p) : 3 \\
 & \beta \cdot \bar{x} \quad (\beta \cdot x_1, n_1), (\beta \cdot x_2, n_2), \dots, (\beta \cdot x_p, n_p) : 4 \\
 & : \\
 & (x_1, n_1), (x_2, n_2), \dots, (x_p, n_p), (y_1, m_1), (y_2, m_2), \dots, (y_R, m_R) \\
 & \bar{x} = \frac{n \cdot \bar{x} + m \cdot \bar{y}}{n + m} : \quad \bar{x} \\
 & (x_1, n_1), (x_2, n_2), \dots, (x_p, n_p) \quad \bar{x} : \\
 & (y_1, m_1), (y_2, m_2), \dots, (y_R, m_R) \quad \bar{y} \\
 & m = m_1 + m_2 + \dots + m_p \quad n = n_1 + n_2 + \dots + n_p
 \end{aligned}$$

16

25

15

17

$$\frac{15 \cdot 16 + 25 \cdot 17}{15 + 25} :$$

16,625 :

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/3

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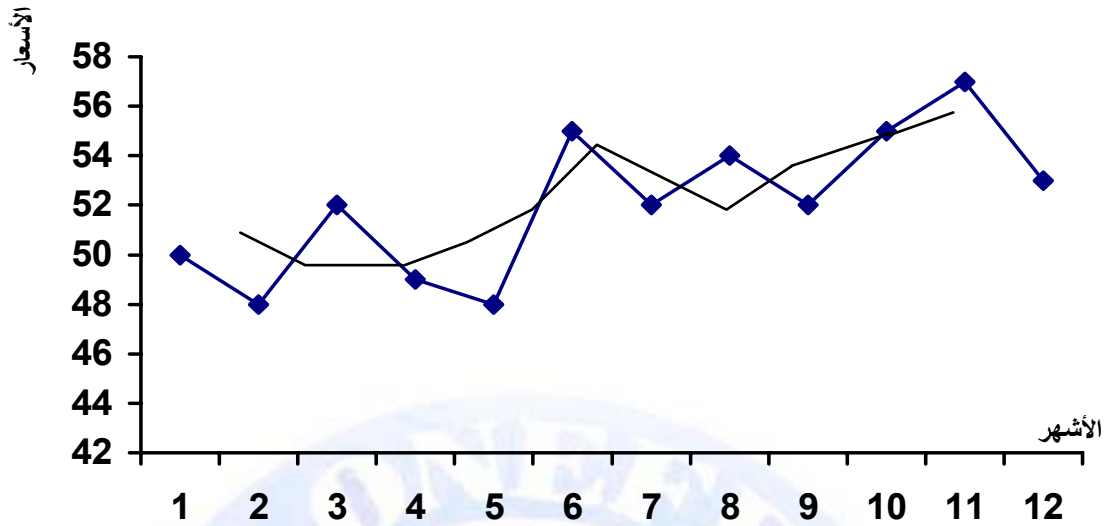
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12

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-

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" "

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/4

أ- : $(x_1, n_1), (x_2, n_2), \dots, (x_p, n_p)$

\bar{x} : V :

$$V = \frac{n_1(x_1 - \bar{x})^2 + n_2(x_2 - \bar{x})^2 + \dots + n_p(x_p - \bar{x})^2}{n_1 + n_2 + \dots + n_p}$$

B A

2,18,10,2,18 : A

8,10,9,11,12 : B

A V_A \bar{x}_A

B V_B \bar{x}_B

$\bar{x}_A = 10$: $\bar{x}_A = \frac{2 \times 2 + 2 \times 18 + 1 \times 10}{2 + 2 + 1}$:

$$\bar{x}_B = 10 : \quad \bar{x}_B = \frac{1.8+1.9+1.10+1.11+1.12}{5}$$

$$V_A = 51,2 : \quad V_A = \frac{2(2-10)^2 + 1(10-10)^2 + 2(18-10)^2}{5}$$

$$V_B = \frac{(8-10)^2 + (9-10)^2 + (10-10)^2 + (11-10)^2 + (12-10)^2}{5}$$

$$V_B = 2 :$$

: ¶

"

"

"

"

"

B

A

:

-ب-

$$(x_1, n_1), (x_2, n_2), \dots, (x_p, n_p)$$

$$- \quad - \quad V \quad \bar{x}$$

$$n = n_1 + n_2 + \dots + n_p$$

$$V = \frac{1}{n} [n_1(x_1 - \bar{x})^2 + n_2(x_2 - \bar{x})^2 + \dots + n_p(x_p - \bar{x})^2]$$

:

$$V = \frac{1}{n} [n_1(x_1^2 + 2x_1\bar{x} + \bar{x}^2) + n_2(x_2^2 - 2x_2\bar{x} + \bar{x}^2) + \dots + n_p(x_p^2 - 2x_p\bar{x} + \bar{x}^2)]$$

:()

$$V = \frac{1}{n} [(n_1 + n_2 + \dots + n_p)(\bar{x})^2 - 2\bar{x}(n_1x_1 + n_2x_2 + \dots + n_px_p) + n_1x_1^2 + n_2x_2^2 + \dots + n_px_p^2]$$

:

$$n_1x_1 + n_2x_2 + \dots + n_px_p = n\bar{x} \quad n_1 + n_2 + \dots + n_p = n$$

$$V = \frac{1}{n} [n(\bar{x})^2 - 2\bar{x}(n\bar{x}) + n_1x_1^2 + n_2x_2^2 + \dots + n_px_p^2]$$

$$V = \frac{1}{n} [n(\bar{x})^2 - 2n\bar{x}^2 + n_1x_1^2 + n_2x_2^2 + \dots + n_px_p^2]$$

$$\begin{aligned}
 & (x_1, n_1), (x_2, n_2), \dots, (x_p, n_p) \\
 & V \quad \bar{x} \\
 & n = n_1 + n_2 + \dots + n_p : \quad V = \frac{n_1 x_1^2 + n_2 x_2^2 + \dots + n_p x_p^2}{n}
 \end{aligned}$$

$$\begin{aligned}
 & \bar{x} \\
 & B \quad A \\
 & V_A = 51,2 : \quad V_A = \frac{2 \cdot 2^2 + 1 \cdot 10^2 + 2 \cdot 18^2}{5} - 10^2 \\
 & V_B = 2 : \quad V_B = \frac{8^2 + 9^2 + 10^2 + 11^2 + 12^2}{5} - 10^2
 \end{aligned}$$

$$r \quad v \quad r = \sqrt{v}$$

(SD)stat

- ¶ 1
- ¶ 2

أ-

:

Q_1 ()
25% Q_1

Q_3 ()
75% Q_1
($Q_1 - Q_3$) $[Q_1, Q_3]$

D_1 ()
10% D_1

D_9 () :
90% D_9
($D_9 - D_1$) $[D_1, D_9]$

ب-

() D_9 D_1 Q_3 Q_1

N

()

$$\frac{N}{4}$$

$$\frac{N}{4}$$

Q_1

$$\frac{3N}{4}$$

Q_3

$$\frac{N}{4}$$

$$\frac{N}{4} \quad Q_1$$

$$\frac{3N}{4} \quad Q_3$$

$$\frac{N}{10} \quad \bullet$$

$$\frac{N}{10} \quad D_1$$

$$\frac{9N}{10} \quad D_9$$

$$\frac{N}{10} \quad \bullet$$

$$\frac{N}{10} \quad D_1$$

$$\frac{9N}{10} \quad D_9$$

:

①

2-2,5-4-5-6,75-8-9-9-11,5-11,5-12-13

$$\frac{3N}{4} = 9 \quad \frac{N}{4} = 3 \quad 12 \quad N$$

$$Q_1 = 4 : 3$$

$$Q_3 = 11,5 : 9$$

		8	10	12	13	14	15	16
		15	45	20	70	50	10	5
		15	60	80	150	200	210	215
	17	18	19	20	22	25	26	
	5	30	16	6	3	3	13	
	220	250	266	272	275	278	91	

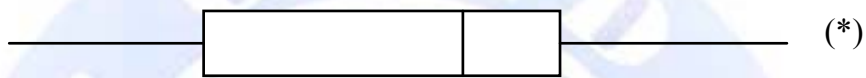
$\frac{N}{10} = 29,1$ $\frac{3N}{4} = 218,25$ $\frac{N}{4} = 72,75$ 291 N
 $\frac{9N}{10} = 261,9$
 $Q_1 = 12 :$ 60
 $Q_3 = 17 :$ 215
 $D_1 = 10 :$ 15
 $D_9 = 19 :$ 250
 (\quad) -
 (\quad)
 $(\min x \quad)$

(me med Q_2)

($Max x$ Q_3)

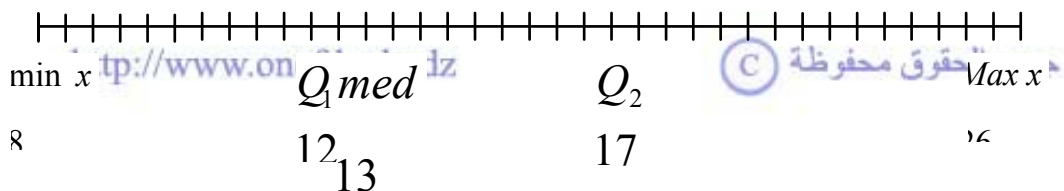
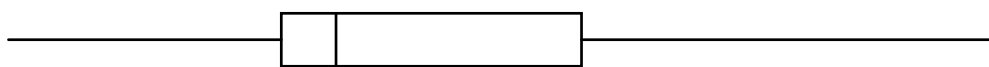
$min x$ () " "

Q_3 med Q_1 : $Max x$



" " (Moustaches) " " " " (*)
 (Pattes)

291 - - (5) 2
 145 med 145) 146 med
 80 150 med (med
 : $med = 13$:



D_1 min x

: ٩

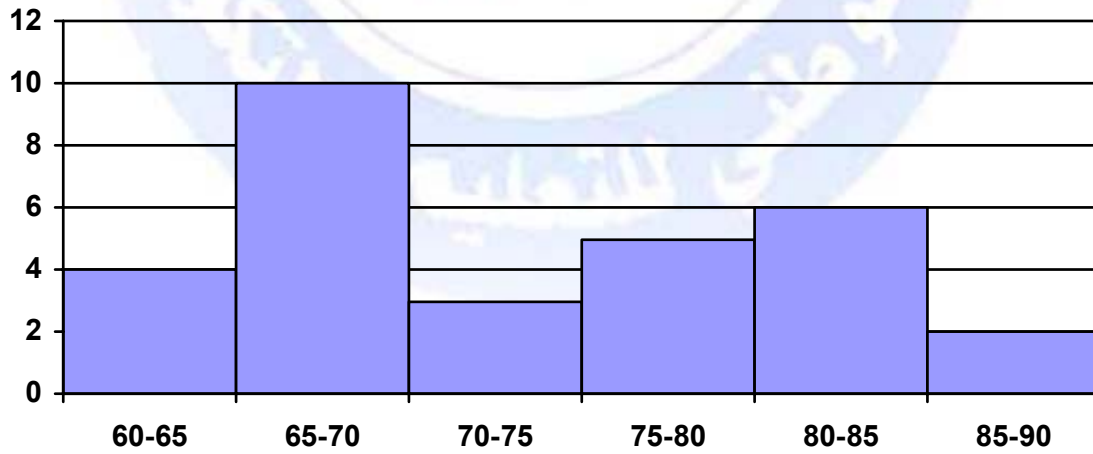
D_9 Max x

50%

:1

()

30



أ- ①

ب-

②

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[60,70[[70,85[[85,90[

ب- S_3, S_2, S_1

[85,90[[70,85[[60,70[

S_3

$S_1 - S_2 = 0 \quad S_1 + S_2 = 140 : \quad S_2 \quad S_1$

:2

8 5 10 30

$3 \cdot 6 \cdot 1 \cdot 0 \cdot 4 \cdot 0 \cdot 4 \cdot 0 \cdot 12 \cdot 5$

$12 \cdot 6 \cdot 4 \cdot 6 \cdot 3$

$4 \cdot 10 \cdot 1 \cdot 2 \cdot 6 \cdot 0 \cdot 4 \cdot 3$

①

(23)

$\bar{x} \quad \bar{z} \quad \bar{y} \quad \bar{x}$

②

\bar{y}

\bar{x}

\bar{z}

③

(23)

أ-

3

بـ

:3

8 8

: 20

07,11,20,14 11,17,15,11 :

6,17,6,6,10,17,19,18 :

\bar{y}

\bar{x}

①

U_x

②

V_y

③

④

:4

7

7

2006

(

)

11,10,2,9,9,8 :

4,3,2,10,7,1 :

\bar{y}

\bar{x}

①

$\sqrt{V_x}$

V_x

②

$\sqrt{V_y}$

V_y

③

④

:5

2006

30

20

	20	19	19	17	17	17	16	16	15	14
14	14	14	13	13	12	11	11	10	10	
10	10	9	9	9	8	8	8	7	7	

1

2

3

4

0,25

:6

	1	2	3	4	5	6	7	8	9	10
	20	22	16	24	30	18	24	20	32	25

1

2

.3

.5

.7

ب-

ج-

3

3

:7

	7	7.5	9	10	11	11.5	12	14	16	16.5
	10	14	5	13	20	11	5	14	2	7

Q_1

$\max x$

$\min x :$

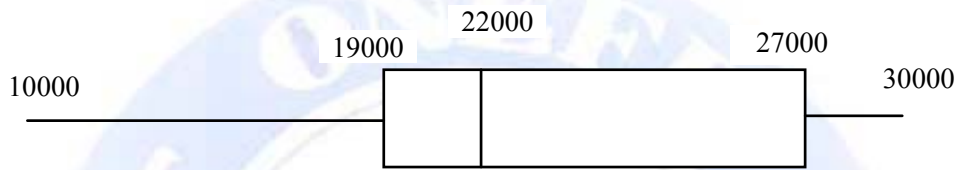
①
②

Q_3

Med

③

:8



$Me, Q_3, Q_1, D_9, D_1 :$

①

②