

Quantile deviation

الاختلاف الرباعي

I/ For ungrouped data:

$$QD = \frac{Q_3 - Q_1}{2}$$

where Q_1 and Q_3 are first and third quartiles.

Q/ Find the Quantile deviation of the data:

8, 7, 11, 10, 13, 14, 9, 12

① ranked the data from smallest to largest.

7, 8, 9, 10, 11, 12, 13, 14

The first Quartiles $Q_1 = \frac{N}{4} = \frac{8}{4} = 2$

The third Quartiles $Q_3 = \frac{3N}{4} = \frac{3 \times 8}{4} = \frac{24}{4} = 6$

$\therefore Q_1 = 8$ and $Q_3 = 12$

$$\therefore QD = \frac{Q_3 - Q_1}{2} = \frac{12 - 8}{2} = \frac{4}{2} = 2$$

II/ For grouped data -

$$Q_1 = L + \left(\frac{\frac{N}{4} - f_c}{f_q} \right) \times i$$

L is lower limit of interval

$$Q_3 = L + \left(\frac{\frac{3N}{4} - f_c}{f_q} \right) \times i$$

i is length of interval
 f_c is cumulative frequency up to the interval of quartile

$$QD = \frac{Q_3 - Q_1}{2}$$

f_q is the frequency of interval of quartile.

For grouped data -

Q1 Find the quartile deviation from the table:

class	frequency
20-30	13
30-40	15
40-50	10
50-60	25
60-70	6
70-80	11

classes	frequency	cumulative frequency
20-30	13	13
30-40	15	28 Q_1
40-50	10	38
50-60	25	63 Q_3
60-70	6	69
70-80	11	80

حرتيب الرابع
الاول $Q_1 = 1 \frac{N}{4} = \frac{80}{4} = 20$

حرتيب الثالث
الثالث $Q_3 = 3 \frac{N}{4} = \frac{3 \times 80}{4} = \frac{240}{4} = 60$

$$Q_1 = L_b + \frac{\frac{N}{4} - f_c}{\sum f_i} \times h_i$$

$$Q_1 = 30 + \frac{(20 - 13)}{15} \times 10 = 34.67$$

$$Q_2 = 50 + \frac{(60 - 38)}{25} \times 10 = 58.8$$

$$Q = \frac{Q_3 - Q_1}{2} = \frac{58.8 - 34.67}{2} = 12.055$$

Coefficient of Quartile deviation

$$CQD = \frac{Q_3 - Q_1}{Q_3 + Q_1}$$

Q1 IF the first set of data have

$$Q_1 = 20 \text{ and } Q_3 = 35 \text{ and}$$

the second set of data have

$$Q_1 = 3 \quad Q_3 = 8 \text{ which data has}$$

more variation

$$(CQD)_1 = \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{35 - 20}{35 + 20} = \frac{15}{55} = \frac{3}{11} = 0.27$$

$$(CQD)_2 = \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{8 - 3}{8 + 3} = \frac{5}{11} = 0.45$$

تقدیر حریجہ المبرورہ، شائستگی، کلمہ کتبہ کوئی
المبرورہ الأولى ..

Coefficient of Variation

$$C.V = \frac{S}{\bar{X}} \times 100\%$$

Q1/ For the first group the $\bar{x}_1 = 70$

$S_1 = 12$ and for the second

group the $\bar{x}_2 = 6500$ and $S_2 = 500$,

which of the two groups is more variation

$$(C.V)_1 = \frac{S}{\bar{X}} \times 100\%$$

$$(C.V)_1 = \frac{12}{70} \times 100\% = 17.14\%$$

$$(C.V)_2 = \frac{500}{6500} \times 100\% = 7.69\%$$

في الحقيقة الأولى أكثر تفرقاً.

Q1/ Find the coefficient of variance of the following data. 5, 10, 15, 20

$$\bar{x} = \frac{\sum x_i}{n} = \frac{50}{4} = 12.5$$

$$S = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}$$

x_i $x_i - \bar{x}$ $(x_i - \bar{x})^2$

5 -7.5 56.25

10 -2.5 6.25

15 2.5 6.25

20 7.5 56.25

$$\sum (x_i - \bar{x})^2 = 125$$

$$S = \sqrt{\frac{125}{4}} = \sqrt{31.25}$$

$$S = 5.59$$

$$C.V = \frac{S}{\bar{x}} \times 100$$

$$C.V = \frac{5.59}{12.5} \times 100$$

$$C.V = 0.447$$

(4)

Standard Score (normalized) درجه معیار

$$z = \frac{x - \bar{x}}{s}$$

Standard error

خطای معیار

$$SE = \frac{s}{\sqrt{N}}$$

Q / From the data 68, 75, 81, 87, 90

Find the z-score of 75.

$$\bar{x} = \frac{\sum x_i}{N} = \frac{401}{5} = 80.2$$

x_i	$(x_i - \bar{x})$	$(x_i - \bar{x})^2$
68	-12.2	148.84
75	-5.2	27.04
81	0.8	0.64
87	6.8	46.24
90	9.8	96.04

$$\sum (x_i - \bar{x})^2 = 318.8$$

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N}} = \sqrt{\frac{318.8}{5}} = \sqrt{63.76} = 7.98$$

$$z = \frac{75 - 80.2}{7.98} = \frac{-5.2}{7.98} = -0.6516$$