

Finding The Quartiles

When finding the quartiles from raw data it is essential to sort the data first, so that they are in ascending order. Then the quartiles are defined (somewhat loosely) as being the data items at certain locations in the list or array.

Definitions

n is the number of data items.

Quartile 0, Q_0 , is the 0% mark of the data, ie the start of the data. It is item 1 in the list.

☛ In Excel, use the formula =min(cells) to find Q_0 .

Quartile 1, Q_1 , is the 25% mark of the data, ie one quarter of the way through the data. It is item $\frac{n+1}{4}$ in the list.

☛ In Excel, use the formula =quartile(cells,1) to find Q_1 .

Quartile 2, the median, is the 50% mark of the data. It is item $\frac{n+1}{2}$ in the list.

☛ In Excel, use the formula =quartile(cells,2) or =median(cells) to find Q_2 .

Quartile 3, Q_3 , is the 75% mark of the data, ie three quarters of the way through the data. It is item $\frac{3(n+1)}{4}$ in the list.

☛ In Excel, use the formula =quartile(cells,3) to find Q_3 .

Quartile 4, Q_4 , is the 100% mark of the data, ie the highest value in the list.

☛ In Excel, use the formula =max(cells) to find Q_4 .

Exercise 1

Find the *index* of the quartiles for the following list lengths. Answers are at the end.

Length \ Index of	Q_0	Q_1	Q_2	Q_3	Q_4
12					
9					
20					
13					

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Exercise 2

Given the list below, find the value of the data "item" located at the given index.

1	2	3	4	5	6	7	8	9	10
8	9	13	15	19	19	20	21	23	28

Index	1.5	2.25	3.25	3.75
Item	$\frac{8+9}{2} = 8.5$	$9 + 0.25 * (13 - 9) = 10$		

Exercise 3

Find the five number summary for the list below.

84, 87, 89, 89, 94, 94, 96, 99, 100, 102

Answers

Exercise 1

<i>n</i>	Index Q_0	Index Q_1	Index Q_2	Index Q_3	Index Q_4
12	1	3.25	6.5	9.75	12
9	1	2.5	5	7.5	9
20	1	5.25	10.5	15.75	20
13	1	3.5	7	10.5	13

Exercise 2

Item 3.25 is $13 + 0.25 * (15 - 13) = 13.5$.

Item 3.75 is $13 + 0.75 * (15 - 13) = 14.5$.

Exercise 3

$n=10$

$Q_0=184, Q_4=102$

$Q_2 = \text{item } 5.5 = \frac{94 + 94}{2}$

$Q_1 = \text{item } 2.75 = 87 + 0.75 * (89 - 87) = 88.5$

$Q_3 = \text{item } 8.25 = 99 + 0.25 * (100 - 99) = 99.25$

