Quartiles for ungrouped data examples pdf

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Quartiles & PercentilesQuartiles for ungrouped dataQuartiles are non-central measures that divide an ordered data set into quarters (i.e. four equal parts).Quartiles are denoted as Q1,Q2and Q31. Lower quartile, Q1, is that data value that separates the lower (bottom) 25% of (ordered) datavalues from the top 75% of ordered data values.2. Middle quartile, Q2, is the median. It divides an ordered data set into two equal halves.3. Upper Quartile, Q3, is that data value that separates the top (upper) 25% of (ordered) data valuesfrom the bottom 75% of ordered data values.Quartile positions:For Q1, quartile position is n+ 14or 0.25 ×(n+ 1)For Q2, quartile position is n+ 12or 0.5×(n+ 1)For Q3, quartile position is 3×(n+ 1)4or 0.75 ×(n+ 1)If quartile position is not an integer, we can find quartile value using the following equation.Quartile value =approximate quartile value + fraction part of quartile position×consecutive value after quartile position - approximate quartile value 1 Quartiles The quartiles divide the data (in ascending order) into four quarters. Every quarter has the same number of items. There are three quartiles: ● The lower quartile (Q1) ● The middle quartile or median (Q2) ● The upper quartile (Q3) Interquartile range The interquartile range is the difference between the third quartile and the first quartile. It measures the range of the middle 50% of the data (in ascending order). A large interquartile range indicates the data Values are widely dispersed. ● Interquartile range = Third quartile – First quartile ● IQR=Q3–Q1 Semi-interquartile range The semi-interquartile range is half of the range of the middle half of the data. It is seldom influenced by extreme values in a set of data, and so is a good measure of dispersion. Question 1. Given a data set in ascending order. Find the median, quartiles and the interquartile range (IQR). 2 5 5 6 9 11 11 11 14 15 19 Solution: Square the median. (Because I didn't know way to circle the median in the software ^_^) The median represents the middle of the data. The data has been divided into two parts. Consider the set of data on each side of the median and circle the median again: The circled numbers represent the quartiles — Quartile 1 (Q1), Quartile 2 (Q2), and Quartile 3 (Q3). These values split the set of data into quarters. Thus Quartile 2 can also be called the median). The interquartile range (IQR) can be calculated by subtracting quartile 1 from quartile 3 (Q3–Q1),. The IQR of this set of data is 14-5=9. Question 2. For the data set: 7, 3, 1, 7, 6, 9, 3, 8, 5, 8, 6, 3, 7, 1, 9 find the: a) median b) lower quartile c) upper quartile d) interquartile range The ordered data set is: solution: a) As n=15, (n+1)/2=8 ∴ the median=8th data value=6 b/c) As the median is a data Value we now ignore it and split the remaining data into two: Q1= median of lower half =3 Q3= median of upper half =8 d) IQR =Q3–Q1=8-3=5 The data set in Question 2 can be summarised as the followong picture: Question 3. For the data set: 6, 4, 9, 15, 5, 13, 7, 12, 8, 10, 4, 1, 13, 1, 6, 4, 5, 2, 8, 2 find: a) the median b) Q1 c) Q3 d) the interquartile range The ordered data set is: solution: a) As n=20, ½(n+1)=10.5 b/c) As we have an even number of data values, we split the data into two: d) IQR =Q3–Q1=9.5-4=5.5 Question 4. The marks obtained by 19 students of a class are given below: 27, 36, 22, 31, 25, 26, 33, 24, 37, 32, 29, 28, 36, 35, 27, 26, 32, 35 and 28. Find: (i) median (ii) lower quartile (iii) upper quartile (iv) interquartile range solution: Arranging in ascending order: 22, 24.25. 26. 26.27. 27.28. 28. 29.21. 32. 32, 33. 35. 35. 36. 36. 37 (i) Middle term is 10th term i.e. 29 Median=29 (ii) Lower quartile = (iii) Upper quartile = (iv) Interquartile range =Q3–Q1=35-26=9 Question 5. From the following data, find: (i) Median (ii) Upper quartile (iii) Inter-quartile range 25, 10, 40, 88, 45, 60, 77, 36, 18, 95, 56, 65, 7, 0, 38 and 83 solution: Arrange in ascending order: 0.7, 10, 18, 25, 36, 38, 40, 45, 56, 60, 65, 77, 83, 88, 95 (i) Median is the mean of 8th and 9th term (ii) Upper quartile= (iii) Interquartile range= Interquartile range =Q3–Q1=65-18=47 Question 6. The data below shows the number of laptops sold by 15 sales agents during the last financial year. 43 48 62 52 46 90 58 37 48 73 84 68 54 34 78 (a). Determine the median of the number of laptops sold. (b). Calculate the range of the data. (c). Calculate the interquartile range (IQR). solution: Arranging the data in ascending order, we obtain 34 37 43 46 48 48 52 54 58 62 68 73 78 84 90 Here, the numbers of observations are 15, which is odd. (a). Median,Me=½(15+1)th observation=8th ob. Me=54 (b). Range =90-34=56 (c). The median cuts the data into two sections. In section I we can get lower quartile and in section II we can get upper one. We obtain the section I. 34 37 43 46 48 48 52 Q1=½(7+1)th observation=4th observation. Q1=46 Then the section II. 58 62 68 73 78 84 90 Q3=73 IQR=Q3–Q1=73-46=27 Question 7. The heights of 20 children were measured (in centimetres) and the results were recorded. The data collected is given in the table below. 127 128 129 130 131 133 134 134 135 136 137 138 139 140 141 142 142 143 144 145 (a). Write down the median height measured. (b). Determine: (b-i). The mean height (b-ii). The range (b-iiii). The interquartile range solution: The set of values is already in ascending order. (a) Because n=20 is even, median (b-i). Mean =2728/20=136.4 (b-ii). Range =145-127=18 cm (b-iii). The median cuts the data into two sections. In section I we can get lower quartile and in section II we can get upper one. We obtain the section I. 127 128 129 130 131 133 134 134 135 136 Lower quartile Then the section II. 137 138 139 140 141 142 142 143 144 145 upper quartile Interquartile range is equal to the difference between upper quartile and lower quartile. =141.5-132=9.5 cm Question 8. For each of the following data sets, compute the mean and all the quartiles. Round your answers to one decimal place. a) -3.4;-3.1;-6.1;-1.5;-7.8;-3.4;-2.7;-6.2 b) -6;-99;90;81;13;-85;-60;65;-49 c) 7;45;11;3;9;35;31;7;16;40;12;6 Solution: a) Mean: To compute the quartiles, we order the data: -7.8;-6.2;-6.1;-3.4;-3.4-;-3.1;-2.7;-1.5 We use the diagram below to find at or between which values the quartiles lie. For the first quartile the position is between the second and third values. The second value is -6.2 and the third value is -6.1, which means that the first quartile is (-6.2-6.1)/2=-6,15. For the median (second quartile) the position is halfway between the fourth and fifth values. Since both these values are -3.4, the median is -3.4. For the third quartile the position is between the sixth and seventh values. Therefore the third quartile is -2.9. To compute the quartiles, we order the data: -99;-85;-60;-49;-6;13;65;81;90 We use the diagram below to find at or between which values the quartiles lie. We see that the quartiles are at -60; -6; and 65. c) The mean is x̄=18.5. To compute the quartiles, we order the data: 3;6;7;7;9;11;12;16;31;35;40;45 We use the diagram below to find at or between which values the quartiles lie. For the first quartile the position is between the third and fourth values. Since both these values are equal to 7, the first quartile is 7. For the median (second quartile) the position is halfway between the sixth and seventh values. The sixth value is 11 and the seventh value is 12, which means that the median is (11+12)/2=11.5. For the third quartile the position is between the ninth and tenth values. Therefore the third quartile is (31+35)/2=33. Question 9. The weight of 60 boys are given in the following distribution table: Find: (i) median (ii) lower quartile (iii) upper quartile (iv) interquartile range solution: Number of terms=60 (i) median=the mean of the 30th and the 31st terms ii) lower quartile (Q1)=60/4 th term =15th term =38 (iii) upper quartile (Q3) =(3×60)/4 th term =45th term =40 (iv) Interquartile range =Q3–Q1=40-38=2. Let's read post The Quartile Common Formulae for Continuous or Discrete Distribution (Grouped Data). Related Pages Frequency Table Cumulative Frequency Graph More Statistics Lessons We have learned that the median is the middle value when a set of data is arranged in order of increasing magnitude. We will now consider lower quartiles and upper quartiles. The median divides the data into a lower half and an upper half. The lower quartile is the middle value of the lower half. The upper quartile is the middle value of the upper half. The following figure shows the median, quartiles and interquartile range. Scroll down the page for examples and solutions. How To Find Median, Quartiles And Percentiles? Example: Find the median, lower quartile and upper quartile of the following numbers. 12, 5, 22, 30, 7, 36, 14, 42, 15, 53, 25 Solution: First, arrange the data in ascending order: Median (middle value) = 22 Lower quartile (middle value of the lower half) = 12 Upper quartile (middle value of the upper half) = 36 If there is an even number of data items, then we need to get the average of the middle numbers. Example: Find the median, lower quartile, upper quartile, interquartile range and range of the following numbers. 12, 5, 22, 30, 7, 36, 14, 42, 15, 53, 25, 65 Solution: First, arrange the data in ascending order: Lower quartile or first quartile = Median or second quartile = Upper quartile or third quartile = Interquartile range = Upper quartile – lower quartile = 39 – 13 = 26 Range = largest value – smallest value = 65 – 5 = 60 When evaluating the quartiles, always remember to first arrange the data in increasing order. How to compute the interquartile range for a set of data? Remember to reorganize the data so that you can find the median values easier. Show Video Lesson Median, Quartiles and Interquartile Range How to calculate median, quartiles and interquartile range for discrete data. Show Video Lesson How to summarize data using quartiles and interquartile range? Show Video Lesson How to Estimate Mean, Median and Quartiles from Continuous Grouped Data? 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