

Interpreting Statistics

percentile - identifies what percent of the data is *less than* the given data value.

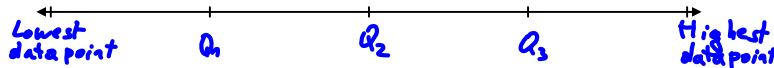
P_0 1% P_1 1% P_2 P_n 1% P_{100} ← 100th percentile
 ← 100th percentile interval

Quartiles are values that divide a body of data into four equal parts.

Q_1 (first quartile) - the median of the lower-half of the data (25th percentile)

Q_2 (second quartile) - the median of the data (50th percentile)

Q_3 (third quartile) - the median of the upper-half of the data (75th percentile)



Example 1: The minimum hourly wage for the service industry in the month of January from 1995 to 2011 have been recorded below.

14.02	14.18	14.40	14.55	15.01	15.47	14.90
14.89	15.23	15.94	16.73	17.19	17.94	18.27
18.95	19.08	20.20				

- What are the quartiles for this data?
- Find the 20th percentile.
- Sarah's wage is in the 85th percentile for this data. What does this mean? What is her hourly wage?

Ans: $n = 17$ $\frac{n}{2} = 8.5$

a) $Q_2 = t_9$
 $= 15.23$ (\$15.23)

14.02	14.18	14.40	14.55	15.01	15.47	14.90	14.89
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$Q_1 = \frac{t_4 + t_5}{2}$ (Lower-half)
 $= \frac{14.55 + 15.01}{2}$
 $= 14.78$ ← (\$14.78)

15.94	16.73	17.19	17.94	18.27	18.95	19.08	20.20
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$Q_3 = \frac{17.94 + 18.27}{2}$
 $= 18.11$ ← (\$18.11)

∴ $Q_1 = 14.78$
 $Q_2 = 15.23$
 $Q_3 = 18.11$

b) ∴ 20% of 17 = $0.20 \times 17 = 3.4$
 ∴ $P_{20} = t_3$ ← round down to 3
 $P_{20} = 14.40$ ← (\$14.40)

c) This means that 85% of the people had hourly wages less than Sarah's hourly wage.

d) ∴ 85% of 17 = $0.85 \times 17 = 14.45$
 ∴ $P_{85} = t_{14}$ ← round down to 14
 $= 18.27$ ← (\$18.27)
 ∴ Sarah's hourly wage is the next one up (15th hourly wage), \$18.95.

Example 2: An audio website is testing 30 different models of speakers. These scores are based on a combined rating for quality, reliability, appearance, and cost.

35 41 45 47 50 53 56 58 59 62 62 63 64 65 67

67 68 69 72 74 75 78 81 82 84 86 88 91 94 98

Does a speaker with a value of 91 place it at the 91st percentile?

Ans: $n=30$ (number of speakers)

$$\therefore 91\% \text{ of } 30 = 0.91 \times 30 \\ = 27.3$$

$$\therefore P_{91} = t_{27} \leftarrow \begin{array}{l} \uparrow \\ \text{round down to } 27 \end{array} \\ = 88$$

\therefore No, it does not. A speaker with a rating of 91 is placed at a higher percentile.

Hint: Pg. 201: #1, 3, 8, 9, 12, 14