Question

A continuous random variable X was measured 28 times. The sorted data are shown below.

30.945	30.998	31.024	31.039	31.090	31.187	31.227
31.232	31.262	31.309	31.335	31.398	31.426	31.440
31.449	31.469	31.486	31.516	31.526	31.530	31.557
31.578	31.741	31.783	31.787	31.798	31.968	32.022

The total of the measurements is 880.122.

Answerlist

- Determine the percentile rank of the value 31.309. In other words, determine what percent of data are less than or equal to 31.309.
- Determine the datum corresponding to a percentile rank of 0.286. In other words, determine x such that 28.6% of the data are less than or equal to x.
- Determine the mean of the measurements.
- Determine the median of the measurements.

Solution

Let x represent a datum of interest. Let i represent that datum's index. Let ℓ represent that datum's percentile. Let n represent the sample size (number of measurements). In general,

$$\ell = \frac{i}{n}$$

Answerlist

- We are given $x = 31.309$. This means $i = 10$. We know $n = 28$. Determine the percentile ℓ.

  $$\ell = \frac{10}{28}$$

  $$\ell = 0.357$$

  So, the answer is 0.357, or 35.7%.
- We are given $\ell = 0.286$. We can use algebra to solve for i.

  $$\ell = \frac{i}{n}$$

  Multiply both sides by n.

  $$n \cdot (\ell) = n \cdot \left(\frac{i}{n}\right)$$

  Simplify both sides.

  $$n\ell = i$$

  To make me happy, switch the sides.

  $$i = n\ell$$

Now, we can evaluate i.

$$i = (28)(0.286)$$

$$i = 8$$

Determine the x associated with $i = 8$.

$$x = 31.232$$

- The mean is $\frac{880.122}{28} = 31.433$
- If n is odd, then median is $x_{\frac{n+1}{2}}$, the value of x when $i = \frac{n+1}{2}$. Otherwise median is mean of $x_{\lfloor \frac{n+1}{2} \rfloor}$ and $x_{\lceil \frac{n+1}{2} \rceil}$. So, median = 31.444.

Meta-information

extype: string exsolution: yup exname: reading hist extol: 0.01