Question

A continuous random variable X was measured 11 times. The sorted data are shown below, along with each datum's index.

i	x
1	10.086
2	10.386
3	10.510
4	11.035
5	12.004
6	12.164
7	12.198
8	12.307
9	12.393
10	12.424
11	12.642

Answerlist

- Determine the percentile rank of the value 12.424. In other words, determine what percent of data are less than or equal to 12.424.
- Determine the datum corresponding to a percentile rank of 0.545. In other words, determine x such that 54.5% of the data are less than or equal to x.

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 $x = 12.424$. This means $i = 10$. We know $n = 11$. Determine the percentile ℓ.

$$\ell = \frac{10}{11}$$

$$\ell = 0.909$$

So, the answer is 0.909, or 90.9%.
- We are given $\ell = 0.545$. We can use algebra to solve for i.

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

Multiply both sides by n.

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

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Simplify both sides.
$$n\ell = i$$
To make me happy, switch the sides.
$$i = n\ell$$
Now, we can evaluate i.
$$i = (11)(0.545)$$
$$i = 6$$
Determine the x associated with $i = 6$.
$$x = 12.164$$

Meta-information

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