

## Question

A continuous random variable  $X$  was measured 24 times. The sorted data are shown below.

40.378	44.818	45.003	47.136	49.442	50.290
50.764	52.402	53.007	53.077	54.369	56.824
56.829	59.376	61.186	66.091	68.283	69.129
71.236	77.816	79.140	92.203	107.397	115.573

## Answerlist

- Determine the percentile rank of the value 45.003. In other words, determine what percent of data are less than or equal to 45.003.
- Determine the datum corresponding to a percentile rank of 0.25. In other words, determine  $x$  such that 25% 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  $\ell$  represent that datum's percentile. Let  $n$  represent the sample size (number of measurements). In general,

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

## Answerlist

- We are given  $x = 45.003$ . This means  $i = 3$ . We know  $n = 24$ . Determine the percentile  $\ell$ .

$$\ell = \frac{3}{24}$$

$$\ell = 0.125$$

So, the answer is 0.125, or 12.5%.

- We are given  $\ell = 0.25$ . 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  $i$ .

$$i = (24)(0.25)$$

$$i = 6$$

Determine the  $x$  associated with  $i = 6$ .

$$x = 50.29$$

## Meta-information

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