Question

A continuous random variable X was measured 13 times. The sorted data are shown below.

74.193	74.569	74.646	74.794	74.818	74.928	75.083	75.311	75.35	75.58
75.619	75.851	76.408							

The total of the measurements is 977.15.

Answerlist

- Determine the percentile rank of the value 74.794. In other words, determine what percent of data are less than or equal to 74.794.
- Determine the datum corresponding to a percentile rank of 0.769. In other words, determine x such that 76.9% 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 $x = 74.794$. This means $i = 4$. We know $n = 13$. Determine the percentile ℓ.

  $$\ell = \frac{4}{13}$$

  $$\ell = 0.308$$

  So, the percentile rank is $\boxed{0.308}$, or 30.8th percentile.
- We are given $\ell = 0.769$. 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.

  $$i = (13)(0.769)$$

$$i = 10$$

Determine the x associated with $i = 10$.

$$x = \boxed{75.58}$$

- The mean: $\bar{x} = \frac{977.15}{13} = \boxed{75.165}$
- If n is odd, then median is $x_{i=\frac{n+1}{2}}$, the value of x when $i = \frac{n+1}{2}$. Otherwise, if n is even, the median is mean of $x_{i=\frac{n}{2}}$ and $x_{i=\frac{n}{2}+1}$. In this case, $n = 13$ and so n is odd.

$$\text{median} = x_{(13+1)/2,} = x_7$$

So, median = $\boxed{75.083}$.

Meta-information

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