

1. 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,

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

(a) We are given $x = 90.922$. This means $i = 5$. We know $n = 11$. Determine the percentile ℓ .

$$\ell = \frac{5}{11}$$

$$\ell = 0.455$$

So, the percentile rank is 0.455, or 45.5th percentile.

(b) We are given $\ell = 0.727$. 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 .

$$i = (11)(0.727)$$

$$i = 8$$

Determine the x associated with $i = 8$.

$$x = \text{92.074}$$

(c) The mean: $\bar{x} = \frac{1007.578}{11} = \text{91.598}$

(d) 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, $n = 11$ and so n is odd.

$$\text{median} = x_{(11+1)/2} = x_6$$

So, median = 91.151.

2. 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,

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

(a) We are given $x = 117.021$. This means $i = 11$. We know $n = 24$. Determine the percentile ℓ .

$$\ell = \frac{11}{24}$$

$$\ell = 0.458$$

So, the percentile rank is 0.458, or 45.8th percentile.

(b) We are given $\ell = 0.125$. 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 .

$$i = (24)(0.125)$$

$$i = 3$$

Determine the x associated with $i = 3$.

$$x = \text{111.079}$$

(c) The mean: $\bar{x} = \frac{2851.072}{24} = \text{118.79}$

(d) 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, $n = 24$ and so n is even.

$$\text{median} = \frac{x_{12} + x_{13}}{2} = \frac{117.73 + 118.073}{2}$$

So, median = 117.9015.