

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 $x = 65.309$. This means $i = 8$. We know $n = 8$. Determine the percentile ℓ .

$$\ell = \frac{8}{8}$$

$$\ell = 1$$

So, the percentile rank is 1, or 100th percentile.

(b) We are given $\ell = 0.625$. 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 .

$$i = (8)(0.625)$$

$$i = 5$$

Determine the x associated with $i = 5$.

$$x = \text{56.347}$$

(c) The mean: $\bar{x} = \frac{426.113}{8} = \text{53.264}$

(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, $n = 8$ and so n is even.

$$\text{median} = \frac{x_4 + x_5}{2} = \frac{53.644 + 56.347}{2}$$

So, median = 54.9955.

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 $x = 109.795$. This means $i = 72$. We know $n = 72$. Determine the percentile ℓ .

$$\ell = \frac{72}{72}$$

$$\ell = 1$$

So, the percentile rank is 1, or 100th percentile.

(b) We are given $\ell = 0.5$. 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 .

$$i = (72)(0.5)$$

$$i = 36$$

Determine the x associated with $i = 36$.

$$x = \text{96.796}$$

(c) The mean: $\bar{x} = \frac{7111.548}{72} = \text{98.772}$

(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, $n = 72$ and so n is even.

$$\text{median} = \frac{x_{36} + x_{37}}{2} = \frac{96.796 + 97.898}{2}$$

So, median = 97.347.