

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 $x = 40.071$. This means $i = 2$. We know $n = 10$. Determine the percentile ℓ .

$$\ell = \frac{2}{10}$$

$$\ell = 0.2$$

So, the percentile rank is $\boxed{0.2}$, or 20th percentile.

(b) We are given $\ell = 0.7$. 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 .

$$i = (10)(0.7)$$

$$i = 7$$

Determine the x associated with $i = 7$.

$$x = \boxed{41.038}$$

(c) The mean: $\bar{x} = \frac{409.248}{10} = \boxed{40.925}$

(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, $n = 10$ and so n is even.

$$\text{median} = \frac{x_5 + x_6}{2} = \frac{40.909 + 40.937}{2}$$

So, median = $\boxed{40.923}$.

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 $x = 40.715$. This means $i = 17$. We know $n = 56$. Determine the percentile ℓ .

$$\ell = \frac{17}{56}$$

$$\ell = 0.304$$

So, the percentile rank is 0.304, or 30.4th percentile.

(b) We are given $\ell = 0.0714$. 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 .

$$i = (56)(0.0714)$$

$$i = 4$$

Determine the x associated with $i = 4$.

$$x = \text{40.15}$$

(c) The mean: $\bar{x} = \frac{2323.662}{56} = \text{41.494}$

(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, $n = 56$ and so n is even.

$$\text{median} = \frac{x_{28} + x_{29}}{2} = \frac{41.43 + 41.444}{2}$$

So, median = 41.437.