

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 $x = 42.46$. 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 $\ell = 0.25$. 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 .

$$i = (8)(0.25)$$

$$i = 2$$

Determine the x associated with $i = 2$.

$$x = \text{40.13}$$

(c) The mean: $\bar{x} = \frac{329.235}{8} = \text{41.154}$

(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.

$$\text{median} = \frac{x_4 + x_5}{2} = \frac{40.813 + 40.96}{2}$$

So, median = 40.8865.

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 $x = 53.043$. This means $i = 39$. We know $n = 45$. Determine the percentile ℓ .

$$\ell = \frac{39}{45}$$

$$\ell = 0.867$$

So, the percentile rank is $\boxed{0.867}$, or 86.7th percentile.

(b) We are given $\ell = 0.578$. 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 .

$$i = (45)(0.578)$$

$$i = 26$$

Determine the x associated with $i = 26$.

$$x = \boxed{50.204}$$

(c) The mean: $\bar{x} = \frac{2214.032}{45} = \boxed{49.201}$

(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, $n = 45$ and so n is odd.

$$\text{median} = x_{(45+1)/2} = x_{23}$$

So, median = $\boxed{49.398}$.