

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 $x = 73.123$. This means $i = 4$. We know $n = 8$. Determine the percentile ℓ .

$$\ell = \frac{4}{8}$$

$$\ell = 0.5$$

So, the percentile rank is $\boxed{0.5}$, or 50th 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 $i = 5$.

$$x = \boxed{73.158}$$

(c) The mean: $\bar{x} = \frac{588.82}{8} = \boxed{73.602}$

(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.

$$\text{median} = \frac{x_4 + x_5}{2} = \frac{73.123 + 73.158}{2}$$

So, median = $\boxed{73.1405}$.

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 $x = 47.527$. This means $i = 9$. We know $n = 21$. Determine the percentile ℓ .

$$\ell = \frac{9}{21}$$

$$\ell = 0.429$$

So, the percentile rank is $\boxed{0.429}$, or 42.9th percentile.

(b) We are given $\ell = 0.286$. 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 .

$$i = (21)(0.286)$$

$$i = 6$$

Determine the x associated with $i = 6$.

$$x = \boxed{44.088}$$

(c) The mean: $\bar{x} = \frac{962.899}{21} = \boxed{45.852}$

(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, $n = 21$ and so n is odd.

$$\text{median} = x_{(21+1)/2} = x_{11}$$

So, median = $\boxed{48.013}$.