

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 $x = 22.755$. This means $i = 9$. We know $n = 10$. Determine the percentile ℓ .

$$\ell = \frac{9}{10}$$

$$\ell = 0.9$$

So, the percentile rank is $\boxed{0.9}$, or 90th percentile.

(b) We are given $\ell = 0.3$. 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 .

$$i = (10)(0.3)$$

$$i = 3$$

Determine the x associated with $i = 3$.

$$x = \boxed{21.99}$$

(c) The mean: $\bar{x} = \frac{221.603}{10} = \boxed{22.16}$

(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.

$$\text{median} = \frac{x_5 + x_6}{2} = \frac{22.351 + 22.352}{2}$$

So, median = $\boxed{22.3515}$.

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 $x = 82.722$. This means $i = 6$. We know $n = 16$. Determine the percentile ℓ .

$$\ell = \frac{6}{16}$$

$$\ell = 0.375$$

So, the percentile rank is $\boxed{0.375}$, or 37.5th 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 .

$$i = (16)(0.125)$$

$$i = 2$$

Determine the x associated with $i = 2$.

$$x = \boxed{58.404}$$

(c) The mean: $\bar{x} = \frac{1585.502}{16} = \boxed{99.094}$

(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, $n = 16$ and so n is even.

$$\text{median} = \frac{x_8 + x_9}{2} = \frac{95.188 + 106.464}{2}$$

So, median = $\boxed{100.826}$.