

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 $x = 59.591$. 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 $\ell = 0.375$. 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 .

$$i = (8)(0.375)$$

$$i = 3$$

Determine the x associated with $i = 3$.

$$x = \text{20.227}$$

(c) The mean: $\bar{x} = \frac{319.642}{8} = \text{39.955}$

(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.

$$\text{median} = \frac{x_4 + x_5}{2} = \frac{39.698 + 45.039}{2}$$

So, median = 42.3685.

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 $x = 22.193$. This means $i = 7$. We know $n = 18$. Determine the percentile ℓ .

$$\ell = \frac{7}{18}$$

$$\ell = 0.389$$

So, the percentile rank is $\boxed{0.389}$, or 38.9th percentile.

(b) We are given $\ell = 0.222$. 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 .

$$i = (18)(0.222)$$

$$i = 4$$

Determine the x associated with $i = 4$.

$$x = \boxed{22.057}$$

(c) The mean: $\bar{x} = \frac{403.933}{18} = \boxed{22.441}$

(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, $n = 18$ and so n is even.

$$\text{median} = \frac{x_9 + x_{10}}{2} = \frac{22.397 + 22.53}{2}$$

So, median = $\boxed{22.4635}$.