

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 $x = 24.707$. 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 $\ell = 0.25$. 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 $i = 2$.

$$x = \boxed{20.239}$$

(c) The mean: $\bar{x} = \frac{205.743}{8} = \boxed{25.718}$

(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.

$$\text{median} = \frac{x_4 + x_5}{2} = \frac{24.707 + 26.576}{2}$$

So, median = $\boxed{25.6415}$.

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 $x = 41.084$. This means $i = 7$. We know $n = 40$. Determine the percentile ℓ .

$$\ell = \frac{7}{40}$$

$$\ell = 0.175$$

So, the percentile rank is $\boxed{0.175}$, or 17.5th percentile.

(b) We are given $\ell = 0.75$. 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 .

$$i = (40)(0.75)$$

$$i = 30$$

Determine the x associated with $i = 30$.

$$x = \boxed{57.997}$$

(c) The mean: $\bar{x} = \frac{2011.571}{40} = \boxed{50.289}$

(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, $n = 40$ and so n is even.

$$\text{median} = \frac{x_{20} + x_{21}}{2} = \frac{49.535 + 49.918}{2}$$

So, median = $\boxed{49.7265}$.