

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 $x = 42.136$. This means $i = 7$. We know $n = 8$. Determine the percentile ℓ .

$$\ell = \frac{7}{8}$$

$$\ell = 0.875$$

So, the percentile rank is $\boxed{0.875}$, or 87.5th 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 .

$$i = (8)(0.125)$$

$$i = 1$$

Determine the x associated with $i = 1$.

$$x = \boxed{40.011}$$

(c) The mean: $\bar{x} = \frac{332.219}{8} = \boxed{41.527}$

(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.

$$\text{median} = \frac{x_4 + x_5}{2} = \frac{41.802 + 41.832}{2}$$

So, median = $\boxed{41.817}$.

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 $x = 44.723$. This means $i = 42$. We know $n = 81$. Determine the percentile ℓ .

$$\ell = \frac{42}{81}$$

$$\ell = 0.519$$

So, the percentile rank is 0.519, or 51.9th percentile.

(b) We are given $\ell = 0.111$. 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 .

$$i = (81)(0.111)$$

$$i = 9$$

Determine the x associated with $i = 9$.

$$x = \text{44.028}$$

(c) The mean: $\bar{x} = \frac{3627.606}{81} = \text{44.785}$

(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, $n = 81$ and so n is odd.

$$\text{median} = x_{(81+1)/2} = x_{41}$$

So, median = 44.723.