

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 $x = 41.15$. This means $i = 6$. We know $n = 12$. Determine the percentile ℓ .

$$\ell = \frac{6}{12}$$

$$\ell = 0.5$$

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

(b) We are given $\ell = 0.667$. 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 .

$$i = (12)(0.667)$$

$$i = 8$$

Determine the x associated with $i = 8$.

$$x = \boxed{42.53}$$

(c) The mean: $\bar{x} = \frac{504.245}{12} = \boxed{42.02}$

(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, $n = 12$ and so n is even.

$$\text{median} = \frac{x_6 + x_7}{2} = \frac{41.15 + 42.485}{2}$$

So, median = $\boxed{41.8175}$.

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 $x = 76.036$. This means $i = 11$. We know $n = 24$. Determine the percentile ℓ .

$$\ell = \frac{11}{24}$$

$$\ell = 0.458$$

So, the percentile rank is 0.458, or 45.8th percentile.

(b) We are given $\ell = 0.875$. 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 .

$$i = (24)(0.875)$$

$$i = 21$$

Determine the x associated with $i = 21$.

$$x = \text{90.661}$$

(c) The mean: $\bar{x} = \frac{1934.441}{24} = \text{80.602}$

(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, $n = 24$ and so n is even.

$$\text{median} = \frac{x_{12} + x_{13}}{2} = \frac{76.938 + 77.888}{2}$$

So, median = 77.413.