

**1. Solution**

Let  $x$  represent a datum of interest. Let  $i$  represent that datum's index. Let  $\ell$  represent that datum's percentile. Let  $n$  represent the sample size (number of measurements). In general,

$$\ell = \frac{i}{n}$$

(a) We are given  $x = 90.622$ . This means  $i = 6$ . We know  $n = 12$ . Determine the percentile  $\ell$ .

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

$$\ell = 0.5$$

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

(b) We are given  $\ell = 0.167$ . 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  $i$ .

$$i = (12)(0.167)$$

$$i = 2$$

Determine the  $x$  associated with  $i = 2$ .

$$x = \boxed{90.391}$$

(c) The mean:  $\bar{x} = \frac{1099.844}{12} = \boxed{91.654}$

(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.

$$\text{median} = \frac{x_6 + x_7}{2} = \frac{90.622 + 91.362}{2}$$

So, median =  $\boxed{90.992}$ .

**2. Solution**

Let  $x$  represent a datum of interest. Let  $i$  represent that datum's index. Let  $\ell$  represent that datum's percentile. Let  $n$  represent the sample size (number of measurements). In general,

$$\ell = \frac{i}{n}$$

(a) We are given  $x = 20.601$ . This means  $i = 3$ . We know  $n = 12$ . Determine the percentile  $\ell$ .

$$\ell = \frac{3}{12}$$

$$\ell = 0.25$$

So, the percentile rank is  $\boxed{0.25}$ , or 25th 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  $i$ .

$$i = (12)(0.75)$$

$$i = 9$$

Determine the  $x$  associated with  $i = 9$ .

$$x = \boxed{24.773}$$

(c) The mean:  $\bar{x} = \frac{279.338}{12} = \boxed{23.278}$

(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.

$$\text{median} = \frac{x_6 + x_7}{2} = \frac{22.179 + 23.152}{2}$$

So, median =  $\boxed{22.6655}$ .