

**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  $x = 90.522$ . This means  $i = 4$ . We know  $n = 6$ . Determine the percentile  $\ell$ .

$$\ell = \frac{4}{6}$$

$$\ell = 0.667$$

So, the percentile rank is  $\boxed{0.667}$ , or 66.7th percentile.

(b) We are given  $\ell = 0.833$ . 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  $i$ .

$$i = (6)(0.833)$$

$$i = 5$$

Determine the  $x$  associated with  $i = 5$ .

$$x = \boxed{91.691}$$

(c) The mean:  $\bar{x} = \frac{545.885}{6} = \boxed{90.981}$

(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,  $n = 6$  and so  $n$  is even.

$$\text{median} = \frac{x_3 + x_4}{2} = \frac{90.514 + 90.522}{2}$$

So, median =  $\boxed{90.518}$ .

**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  $x = 92.921$ . This means  $i = 29$ . We know  $n = 30$ . Determine the percentile  $\ell$ .

$$\ell = \frac{29}{30}$$

$$\ell = 0.967$$

So, the percentile rank is  $\boxed{0.967}$ , or 96.7th percentile.

(b) We are given  $\ell = 0.9$ . 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  $i$ .

$$i = (30)(0.9)$$

$$i = 27$$

Determine the  $x$  associated with  $i = 27$ .

$$x = \boxed{92.758}$$

(c) The mean:  $\bar{x} = \frac{2734.833}{30} = \boxed{91.161}$

(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,  $n = 30$  and so  $n$  is even.

$$\text{median} = \frac{x_{15} + x_{16}}{2} = \frac{90.984 + 91.047}{2}$$

So, median =  $\boxed{91.0155}$ .