

**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  $x = 86.061$ . This means  $i = 2$ . We know  $n = 7$ . Determine the percentile  $\ell$ .

$$\ell = \frac{2}{7}$$

$$\ell = 0.286$$

So, the percentile rank is  $\boxed{0.286}$ , or 28.6th percentile.

(b) We are given  $\ell = 1$ . 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  $i$ .

$$i = (7)(1)$$

$$i = 7$$

Determine the  $x$  associated with  $i = 7$ .

$$x = \boxed{89.741}$$

(c) The mean:  $\bar{x} = \frac{610.495}{7} = \boxed{87.214}$

(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,  $n = 7$  and so  $n$  is odd.

$$\text{median} = x_{(7+1)/2} = x_4$$

So, median =  $\boxed{86.982}$ .

**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  $x = 92.35$ . This means  $i = 25$ . We know  $n = 30$ . Determine the percentile  $\ell$ .

$$\ell = \frac{25}{30}$$

$$\ell = 0.833$$

So, the percentile rank is  $\boxed{0.833}$ , or 83.3th percentile.

(b) We are given  $\ell = 0.7$ . 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  $i$ .

$$i = (30)(0.7)$$

$$i = 21$$

Determine the  $x$  associated with  $i = 21$ .

$$x = \boxed{84.757}$$

(c) The mean:  $\bar{x} = \frac{2440.263}{30} = \boxed{81.342}$

(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.

$$\text{median} = \frac{x_{15} + x_{16}}{2} = \frac{75.745 + 80.63}{2}$$

So, median =  $\boxed{78.1875}$ .