

**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  $x = 73.549$ . 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  $\ell = 0.571$ . 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  $i$ .

$$i = (7)(0.571)$$

$$i = 4$$

Determine the  $x$  associated with  $i = 4$ .

$$x = \boxed{76.6}$$

(c) The mean:  $\bar{x} = \frac{533.257}{7} = \boxed{76.18}$

(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 =  $\boxed{76.6}$ .

**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  $x = 81.481$ . This means  $i = 19$ . We know  $n = 42$ . Determine the percentile  $\ell$ .

$$\ell = \frac{19}{42}$$

$$\ell = 0.452$$

So, the percentile rank is  $\boxed{0.452}$ , or 45.2th percentile.

(b) We are given  $\ell = 0.929$ . 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  $i$ .

$$i = (42)(0.929)$$

$$i = 39$$

Determine the  $x$  associated with  $i = 39$ .

$$x = \boxed{81.785}$$

(c) The mean:  $\bar{x} = \frac{3423.248}{42} = \boxed{81.506}$

(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,  $n = 42$  and so  $n$  is even.

$$\text{median} = \frac{x_{21} + x_{22}}{2} = \frac{81.518 + 81.527}{2}$$

So, median =  $\boxed{81.5225}$ .