

**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  $x = 71.781$ . This means  $i = 8$ . We know  $n = 11$ . Determine the percentile  $\ell$ .

$$\ell = \frac{8}{11}$$

$$\ell = 0.727$$

So, the percentile rank is  $\boxed{0.727}$ , or 72.7th percentile.

(b) We are given  $\ell = 0.636$ . 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  $i$ .

$$i = (11)(0.636)$$

$$i = 7$$

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

$$x = \boxed{71.697}$$

(c) The mean:  $\bar{x} = \frac{784.398}{11} = \boxed{71.309}$

(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,  $n = 11$  and so  $n$  is odd.

$$\text{median} = x_{(11+1)/2} = x_6$$

So, median =  $\boxed{70.956}$ .

**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  $x = 22.3$ . This means  $i = 22$ . We know  $n = 32$ . Determine the percentile  $\ell$ .

$$\ell = \frac{22}{32}$$

$$\ell = 0.688$$

So, the percentile rank is  $\boxed{0.688}$ , or 68.8th percentile.

(b) We are given  $\ell = 0.0625$ . 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  $i$ .

$$i = (32)(0.0625)$$

$$i = 2$$

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

$$x = \boxed{20.347}$$

(c) The mean:  $\bar{x} = \frac{721.784}{32} = \boxed{22.556}$

(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,  $n = 32$  and so  $n$  is even.

$$\text{median} = \frac{x_{16} + x_{17}}{2} = \frac{21.95 + 21.956}{2}$$

So, median =  $\boxed{21.953}$ .