

**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  $x = 32.893$ . This means  $i = 6$ . We know  $n = 7$ . Determine the percentile  $\ell$ .

$$\ell = \frac{6}{7}$$

$$\ell = 0.857$$

So, the percentile rank is 0.857, or 85.7th percentile.

(b) We are given  $\ell = 0.143$ . 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  $i$ .

$$i = (7)(0.143)$$

$$i = 1$$

Determine the  $x$  associated with  $i = 1$ .

$$x = \text{32.08}$$

(c) The mean:  $\bar{x} = \frac{228.119}{7} = \text{32.588}$

(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 = 32.584.

**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  $x = 129.523$ . This means  $i = 19$ . We know  $n = 27$ . Determine the percentile  $\ell$ .

$$\ell = \frac{19}{27}$$

$$\ell = 0.704$$

So, the percentile rank is 0.704, or 70.4th percentile.

(b) We are given  $\ell = 0.333$ . 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  $i$ .

$$i = (27)(0.333)$$

$$i = 9$$

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

$$x = \text{94.277}$$

(c) The mean:  $\bar{x} = \frac{3031.203}{27} = \text{112.27}$

(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,  $n = 27$  and so  $n$  is odd.

$$\text{median} = x_{(27+1)/2} = x_{14}$$

So, median = 111.086.