

**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  $x = 50.917$ . This means  $i = 7$ . We know  $n = 9$ . Determine the percentile  $\ell$ .

$$\ell = \frac{7}{9}$$

$$\ell = 0.778$$

So, the percentile rank is  $\boxed{0.778}$ , or 77.8th 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  $i$ .

$$i = (9)(1)$$

$$i = 9$$

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

$$x = \boxed{52.05}$$

(c) The mean:  $\bar{x} = \frac{457.08}{9} = \boxed{50.787}$

(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,  $n = 9$  and so  $n$  is odd.

$$\text{median} = x_{(9+1)/2} = x_5$$

So, median =  $\boxed{50.686}$ .

**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  $x = 165.293$ . This means  $i = 27$ . We know  $n = 30$ . Determine the percentile  $\ell$ .

$$\ell = \frac{27}{30}$$

$$\ell = 0.9$$

So, the percentile rank is  $\boxed{0.9}$ , or 90th percentile.

(b) We are given  $\ell = 0.633$ . 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  $i$ .

$$i = (30)(0.633)$$

$$i = 19$$

Determine the  $x$  associated with  $i = 19$ .

$$x = \boxed{153.478}$$

(c) The mean:  $\bar{x} = \frac{4249.576}{30} = \boxed{141.65}$

(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.

$$\text{median} = \frac{x_{15} + x_{16}}{2} = \frac{149.057 + 149.401}{2}$$

So, median =  $\boxed{149.229}$ .