

STAT 2000, HW 2: Sums and Order Notation

In statistics, we usually refer to x_1 as the first observation, x_2 as the second observation, etc., and x_n as the final observation when we write down our observations in the order they were obtained (where n represents the total number of observations).

In our class example of age, we got for the sample of $n = 8$ men (M):

$$x_1 = 25, x_2 = 21, x_3 = 24, x_4 = 24, x_5 = 19, x_6 = 22, x_7 = 23, x_8 = 19$$

Often, we prefer to work with data that are sorted from smallest to largest, e.g., when calculating the median, we need the data to be sorted. Obviously, we can simply reorder our list above. However, we often use the notation $x_{(1)}$ to refer to the smallest observation, $x_{(2)}$ to refer to the 2nd smallest observation, etc., and $x_{(n)}$ to refer to the largest observation.

Using this notation, our sorted ages for the sample of $n = 8$ men (M) are:

$$x_{(1)} = 19, x_{(2)} = 19, x_{(3)} = 21, x_{(4)} = 22, x_{(5)} = 23, x_{(6)} = 24, x_{(7)} = 24, x_{(8)} = 25$$

Homework Question: (1 point each)

For $x_1 = 5, x_2 = 3, x_3 = 4, x_4 = -2, x_5 = 20$, and $n = 5$, determine the following sums:

$$\sum_{i=1}^n x_i =$$

$$\sum_{i=2}^{n-1} x_i =$$

$$\sum_{i=2}^{n-1} x_{(i)} =$$

$$\sum_{i=2}^{n-1} x_1 =$$

$$\sum_{i=\frac{n+1}{2}}^{\frac{n^2-21}{2}} \frac{x_{n-i}}{x_{(i+1)}} =$$

Extra Credit Question: (0.5 points each)

For $x_1 = 8, x_2 = -3, x_3 = 0, x_4 = -7$, and $n = 4$, determine the following sums:

$$\sum_{i=1}^2 x_i =$$

$$\sum_{i=1}^2 x_{(i)} =$$

$$\sum_{i=1}^2 i \cdot x_{(i)} =$$

$$\sum_{i=(n/2)-1}^{n-2} \frac{x_i}{x_{(i)}} =$$

$$\sum_{i=(n+2)/2}^{n-1} (i-1) \cdot x_{i-1} =$$

$$\sum_{i=n/2}^{(n/2)+1} x_{(i)} \cdot x_{(i+1)} =$$