



AME University  
2nd semester, 2018-19  
EDUC 309  
Educational Statistics

# 1. Assignment

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## 1 Summation notation

Assume the following observation  $X' = \{4, 8, 10, 20\}$ . Answer the following equations using  $X'$  as data.

$$x_a = \frac{n}{2} \cdot \sum_{i=1}^n (2 \cdot x_i) \quad (1)$$

$$x_b = n^2 \cdot \sum_{i=1}^n \left(\frac{n}{x_i}\right) \quad (2)$$

$$x_c = \frac{2n}{3} \cdot \sum_{i=1}^n \left(10 - \frac{2x_i}{n}\right) \quad (3)$$

$$x_d = \sum_{i=1}^n (x_i) + \sum_{i=1}^n \left(\frac{x_i}{2}\right) \quad (4)$$

Submit your assignment either on paper at the beginning of the next class or send it to the course email before the next class.

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## 2 Solution

For all answers 1-4 we know that  $n = 4$ , because  $X' = \{4, 8, 10, 20\}$  has four data points. This gives the following solutions:

$$\begin{aligned}x_a &= \frac{4}{2} \cdot \sum_{i=1}^4 (2 \cdot x_i) \\&= \frac{4}{2} \cdot \left( (2 \cdot 4) + (2 \cdot 8) + (2 \cdot 10) + (2 \cdot 20) \right) \\&= \frac{4}{2} \cdot (8 + 16 + 20 + 40) \\&= \frac{4}{2} \cdot 84 \\&= 2 \cdot 84 = 168\end{aligned}\tag{1}$$

$$\begin{aligned}x_b &= 4^2 \cdot \sum_{i=1}^4 \left( \frac{4}{x_i} \right) \\&= 4^2 \cdot \left( \frac{4}{4} + \frac{4}{8} + \frac{4}{10} + \frac{4}{20} \right) \\&= 4^2 \cdot \left( \frac{10}{10} + \frac{5}{10} + \frac{4}{10} + \frac{2}{10} \right) \\&= 4^2 \cdot \frac{21}{10} \\&= 16 \cdot \frac{21}{10} \\&= \frac{336}{10} = \frac{168}{5} = 33\frac{3}{5} = 33.6\end{aligned}\tag{2}$$

$$\begin{aligned}x_c &= \frac{2 \cdot 4}{3} \cdot \sum_{i=1}^4 \left( 10 - \frac{2x_i}{4} \right) \\&= \frac{2 \cdot 4}{3} \cdot \left( \left( 10 - \frac{2 \cdot 4}{4} \right) + \left( 10 - \frac{2 \cdot 8}{4} \right) + \left( 10 - \frac{2 \cdot 10}{4} \right) + \left( 10 - \frac{2 \cdot 20}{4} \right) \right) \\&= \frac{2 \cdot 4}{3} \cdot \left( \left( 10 - \frac{8}{4} \right) + \left( 10 - \frac{16}{4} \right) + \left( 10 - \frac{20}{4} \right) + \left( 10 - \frac{40}{4} \right) \right) \\&= \frac{2 \cdot 4}{3} \cdot \left( (10 - 2) + (10 - 4) + (10 - 5) + (10 - 10) \right) \\&= \frac{2 \cdot 4}{3} \cdot (8 + 6 + 5 + 0) \\&= \frac{2 \cdot 4}{3} \cdot 19 \\&= \frac{8}{3} \cdot 19 = \frac{8 \cdot 19}{3} = \frac{152}{3} = 50\frac{2}{3} \approx 50.67\end{aligned}\tag{3}$$

$$\begin{aligned}x_d &= \sum_{i=1}^4 (x_i) + \sum_{i=1}^4 \left(\frac{x_i}{2}\right) \\&= (4 + 8 + 10 + 20) + \sum_{i=1}^4 \left(\frac{x_i}{2}\right) \\&= 42 + \sum_{i=1}^4 \left(\frac{x_i}{2}\right) \\&= 42 + \frac{4 + 8 + 10 + 20}{2} \\&= 42 + \frac{42}{2} = 42 + 21 = 63\end{aligned}\tag{4}$$