SUMMATION NOTATION

The capital sigma (Σ) stands for summing everything on the right.

$$\sum_{i=1}^{N} X_i = X_1 + X_2 + ... + X_N$$

Things you CAN do to summations:

1. Pull constants out of them, or into them.

$$\sum_{i=1}^{N} bX_i = b \sum_{i=1}^{N} X_i$$

2. Split apart (or combine) sums (addition) or differences (subtraction)

$$\sum_{i=1}^{N} (bX_i + cY_i) = b \sum_{i=1}^{N} X_i + c \sum_{i=1}^{N} Y_i$$

3. Multiply through constants by the number of terms in the summation

$$\sum_{i=1}^{N} (a + bX_i) = aN + b \sum_{i=1}^{N} X_i$$

Things you CANNOT do to summations:

1. Split apart (or combine) products (multiplication) or quotients (division).

$$\sum_{i=1}^{N} X_i Y_i \neq \sum_{i=1}^{N} X_i \times \sum_{i=1}^{N} Y_i$$

2. Move the exponent out of or into the summation.

$$\sum_{i=1}^{N} X_i^a \neq \left(\sum_{i=1}^{N} X_i \right)^a$$

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Exercise:

$$X = \{2, 9, 6, 8, 11, 14\} \qquad Y = \{7, 1, 3, 5, 0\}$$

1. $\displaystyle\sum_{i=1}^{4} X_i =$

2. $\displaystyle\sum_{i=1}^{4} 2X_i =$

3. $\displaystyle\sum_{i=1}^{4} (X_i + 4) =$

4. $\displaystyle\sum_{i=1}^{3} (X_i + Y_i) =$

5. $\displaystyle\sum_{i=1}^{2} X_i Y_i =$

6. $\displaystyle\sum_{i=1}^{2} X_i \times \sum_{i=1}^{2} Y_i =$

7. $\displaystyle\sum_{i=1}^{2} X_i^2$