Worksheet: Summations

ECON 441: Introduction to Mathematical Economics — Instructor: Div Bhagia

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

$$\sum_{i=1}^{N} x_i = x_1 + x_2 + \ldots + x_N$$

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.

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

Exercise:

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

1. $\sum_{i=1}^{4} x_i =$

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

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

4. $\sum_{i=1}^{3} (x_i + y_i) =$

5. $\sum_{i=1}^{2} x_i y_i =$

6. $\sum_{i=1}^{2} x_i \times \sum_{i=1}^{2} y_i =$

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