

Summation Notation

ECON 441: Introduction to Mathematical Economics

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

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

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:

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

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

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

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

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

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

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

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