

SUMMATION NOTATION

Sigma Notation

- a) Σ sigma is a summation operator which is used to condense a sum expression
- E.g. $x_1 + x_2 + x_3 + x_4 + x_5$ can be condensed as (from video):

For $i = 1, 2, \dots, 5$

- In this case, i is an index of the summation. The value it takes in this case ranges from $i=1$ to $i=5$
- The bottom number indicates where you start adding from.
- The top number indicates where you end.

- b) The quantities being summed may be:

I. Individual variates (x_i)

E.g. for $i = 1, 2, 3, 4$

$$x_1 + x_2 + x_3 + x_4 =$$

II. Product variates ($x_i y_i$)

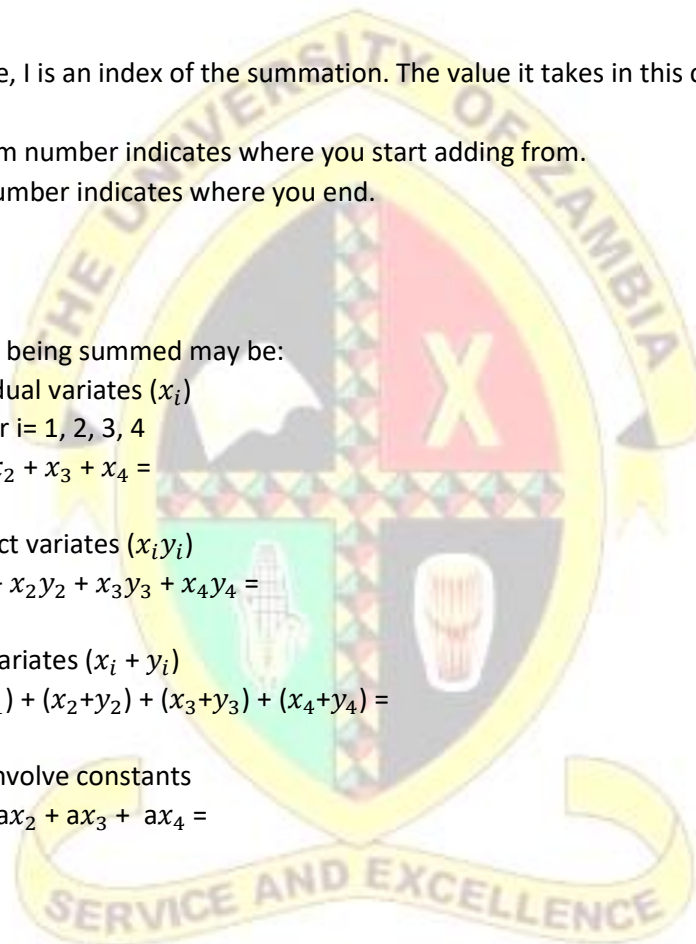
$$x_1 y_1 + x_2 y_2 + x_3 y_3 + x_4 y_4 =$$

III. Sum variates ($x_i + y_i$)

$$(x_1 + y_1) + (x_2 + y_2) + (x_3 + y_3) + (x_4 + y_4) =$$

IV. May involve constants

$$ax_1 + ax_2 + ax_3 + ax_4 =$$

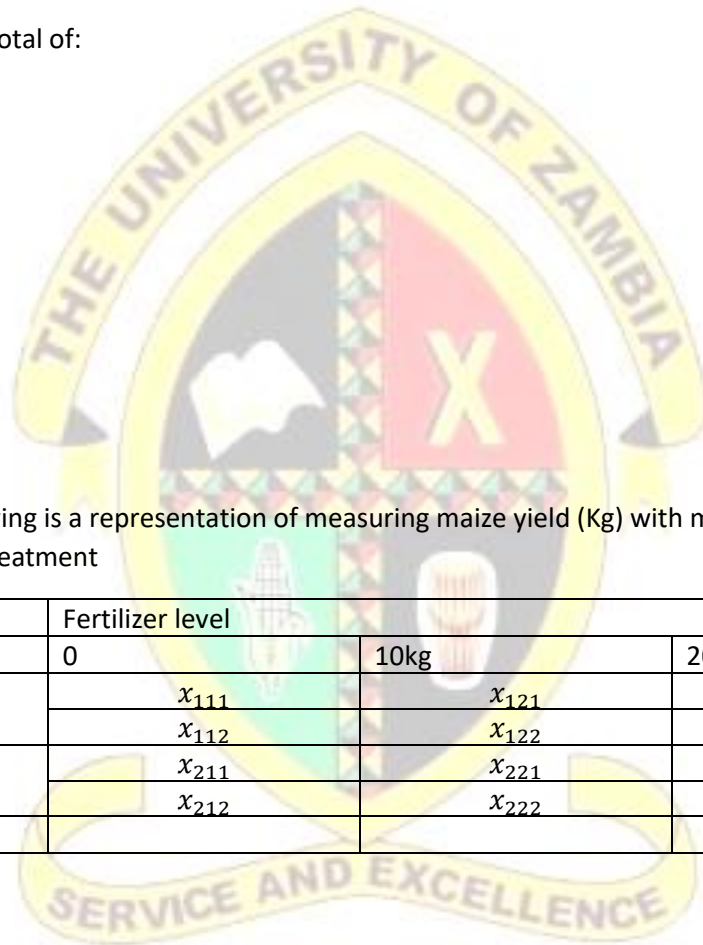


Example 1: The following is a representation of measuring maize yield (Kg)

Planting date	Fertilizer level		
	0kg	10kg	20kg
Nov 1	x_{11}	x_{12}	x_{13}
Dec 2	x_{21}	x_{22}	x_{23}

x_{ij} for $i = 1, 2$ and $j = 1, 2, 3$

This gives us a grand total of:



Example 2: The following is a representation of measuring maize yield (Kg) with more than 1 observation in each treatment

Planting date	Fertilizer level		
	0	10kg	20kg
Nov 1	x_{111}	x_{121}	x_{131}
	x_{112}	x_{122}	x_{132}
Dec 2	x_{211}	x_{221}	x_{231}
	x_{212}	x_{222}	x_{232}

Write sigma notations for the following:

- 1) Total maize yield planted in December, that received 20kg of fertilizer
- 2) Total maize yield planted in December, that received 0kg of fertilizer

3) Total maize yield planted in November, that received 10kg of fertilizer

