

A brief demonstration on how to conduct matrix operations using EXCEL can be found at [View...](#)

Some basic matrix activities:

1. Given $A = \begin{pmatrix} 3 & 6 \\ 2 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 & 3 & 2 \\ 0 & -1 & -1 & 1 \end{pmatrix}$, $X = \begin{pmatrix} 1 \\ 1 \\ 0 \\ 1 \end{pmatrix}$, $Y = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$, either hand calculate or use

EXCEL to find:

- a. AB
 - b. $A'B$
 - c. $(A+A')B$
 - d. $AB+A'B$
 - e. BB'
 - f. $B'B$
 - g. trace of $B'B$
 - h. BX
 - i. $B'BX$
 - j. $X'B'BX$
 - k. AY
 - l. $A'AY$
 - m. A^{-1}
 - n. $(B'B)^{-1}$
2. Use Excel to solve the mixed linear models for the data provided by

Environments	n Env	Line	yield
Low yield	18	1	4.45
Low yield	18	2	4.61
Low yield	18	3	5.27
High yield	9	2	5.00
High yield	9	4	5.82
High yield	9	3	5.79

$$Y_{ijk} = \mu + G_i + E_j + GE_{ij} + \varepsilon_{(ij)k}$$

$$i = 1, \dots, g; j = 1, \dots, e; k = 1, \dots, n$$

$$\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \mathbf{Z}\boldsymbol{v} + \boldsymbol{\varepsilon}$$

$$\begin{pmatrix} 4.45 \\ 4.61 \\ 5.27 \\ 5.00 \\ 5.82 \\ 5.79 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 1 & 0 \\ 1 & 0 \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} b_1 \\ b_2 \end{pmatrix} + \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \end{pmatrix} + \begin{pmatrix} e_1 \\ e_2 \\ e_3 \\ e_4 \\ e_5 \\ e_6 \end{pmatrix}$$