

Exercise 1:

Data are usually presented in matrix form.

e.g. shopping list

	apples	pears	bananas
Fred	6	4	5
Jenny	5	3	7
Lizzy	7	8	3
Joe	5	3	6

e.g. prices

	shop1	shop2	shop3
apples	0,5 €	0,4 €	0,35 €
pears	0,6 €	0,8 €	0,65 €
bananas	0,3 €	0,2 €	0,25 €

Construct a 4*3 matrix with a row for each student and a column for each shop, in which the sum of money is listed, that a student would have to pay in each shop if he buys everything on his shopping list for the price stated. Where should the students buy their fruits? What does all this have to do with matrix multiplication?

Exercise 2:

Answer all the questions concerning the geometrical interpretations of 2*2 matrices in the enclosed spreadsheet. The following 2*2 matrices are treated: identity matrix, dilation matrix, rotation matrix, reflection matrix, symmetric matrix, inverse matrix.

The questions on eigenvalues and eigenvectors for symmetric matrices are not so easy, if you have not heard of the concepts before. Don't spend too much time on them in this case. If you've heard of EV's and EV's before, do try to do them.

Exercise 3:

The transpose, \mathbf{X}^T , of a matrix, \mathbf{X} , is that matrix, that is obtained, when rows and columns are interchanged. So if \mathbf{X} n*m-matrix, \mathbf{X}^T is a m*n-matrix (m and n may be greater than 2 – they may be very large!).

Explain why $\mathbf{X}^T \mathbf{X}$ can always be formed and why it is always square and why it is always symmetric.