Short lecture

Motivating students in an introductory matrix algebra course

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Abstract

Linear algebra is certainly an area of mathematics of increasing importance. Unfortunately, most business and economics students do not appreciate courses in mathematics and statistics. This is particularly true for the (introductory) matrix algebra course because most topics are rather abstract and easy-to-apply examples are difficult to find.

However, magic squares can be very helpful in stimulating students' interest in matrix algebra and are easy to apply. A magic square of order n is a square arrangement of n^2 real numbers, such that the sum of the elements in each row, column, and diagonal is equal to a constant s, its magic sum.

Many interesting activities can be carried out in class at very different stages of the course, using a Computer Algebra System to facilitate computations.

The introductory matrix algebra course takes place every summer semester. This year, magic squares will be used for the first time throughout the course. The idea of using magic squares as examples arose one year ago, but in the 2013 course, the last lecture consisted of a repetition of many different topics using magic squares, and students clearly appreciated this.

Any 3x3 magic square M can be written as the sum of two matrices, $M = sG + N$, where $G = 1/3J$ (J denotes the matrix of ones), and also N has a simple structure defined by only two real numbers. This allows additional interesting activities.

Magic squares from different times and regions, like the ancient Chinese 3x3 Lo-Shu (4,9,2;3,5,7;8,1,6), will be used as examples in the presentation.