Circulant Matrices

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16:00 Wednesday July 3, 2019, Room 1404, MUIC

A (right) circulant matrix is a square matrix in which each row is obtained by a right cyclic shift of a row above it. Similarly, a left-circulant matrix is constructed by a left cyclic shift. For example, the matrices A, B below are right-circulant and left-circulant matrices respectively.

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 4 & 1 & 2 & 3 \\ 3 & 4 & 1 & 2 \\ 2 & 3 & 4 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 1 \\ 3 & 4 & 1 & 2 \\ 4 & 1 & 2 & 3 \end{bmatrix}$$

In this talk, I will discuss some properties of these matrices and prove a result regarding the trace.