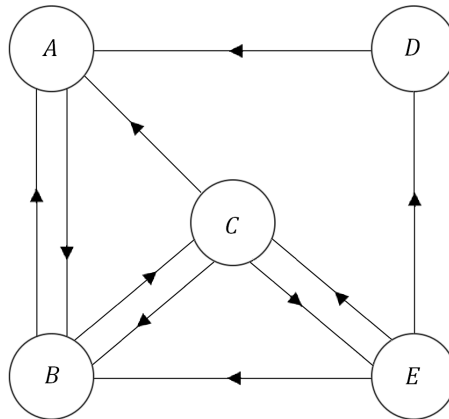

Nonnegative matrices and PageRank

1. Find the most influential vertex in the following graph (and rank the remaining vertices by influence):



2. Разложима ли матрица A ?

$$A = \begin{pmatrix} 0 & 1 & 2 & 0 & 0 \\ 0 & 0 & 0 & 7 & 0 \\ 2 & 0 & 0 & 0 & 0 \\ 0 & 9 & 2 & 0 & 4 \\ 0 & 0 & 0 & 1 & 0 \end{pmatrix}$$

3. Suppose that the spectral radius of a nonnegative $n \times n$ matrix A is less than 1. Prove that this matrix is indecomposable if and only if

$$(E - A)^{-1} > 0.$$

4. Find the Perron–Frobenius eigenvalue and eigenvector for the following matrices:

a) $\begin{bmatrix} 2 & 4 \\ 4 & 8 \end{bmatrix}$; b) $\begin{bmatrix} 0.7 & 0.6 \\ 0.2 & 0.5 \end{bmatrix}$; c) $\begin{bmatrix} 0.1 & 0.0 & 0.0 \\ 0.1 & 0.3 & 0.3 \\ 0.1 & 0.3 & 0.0 \end{bmatrix}$.