

Network Science
Spring 2024
Problem Class 2

Problem class 2 exercises

1. Lecture 1 claimed that the adjacency matrix for a 2-dimensional rectangular lattice has a particular block-diagonal structure. However, the structure of the adjacency matrix depends on how the nodes are numbered. Provide a numbering of the nodes that results in the stated block-diagonal structure
2. Use the results from problem sheet 2, question 3 to argue that $\lambda = 1$ is larger in magnitude than all other eigenvalues and explain why this is important for the computation of the pagerank centrality.
3. Question 3(b) from problem sheet 3 asks you to find $P(k_i^j = k)$, the degree distribution for a node connected to a randomly selected link in a G_{Np} graph. Write this distribution in terms of p_k (the degree distribution for G_{Np} , the expected degree $\langle k \rangle$, and k . Provide an interpretation of your result.