Discrete Optimization

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Name:

1 Assignment-7

Due: Thursday Nov. 3

Please submit your answer in a neat, readable properly organized format.

This assignment includes questions from previous topics in preparation for the coming mid-term.

1. **Suppose $A_i \subset \{1, 2, \ldots, n\}$ is a collection of n subsets such that $|A_i \cap A_j| = 1$. Does this collection have an SDR?**
2. **Prove that if M is an $n \times n$ doubly stochastic matrix then it is a convex combination of permutation matrices.**
3. **Is Herschel's graph (see the folder Supplements in Week-8) Hamiltonian?**
4. **Generate a weighted graph with 10 vertices (use density 3). In this graph find a MCST. Now double every edge of the graph and construct an Eulerian cycle in this new graph.**
5. **Prove that if G is a $2k-$regular graph then it has a spanning $2-$regular subgraph.**
6. **Recall that if G is bipartite then $\nu(G) = \tau(G)$ (König's theorem). We say that G has the König property if $\nu(G) = \tau(G)$. Prove that every graph G is an induced subgraph of a graph with König's property.**