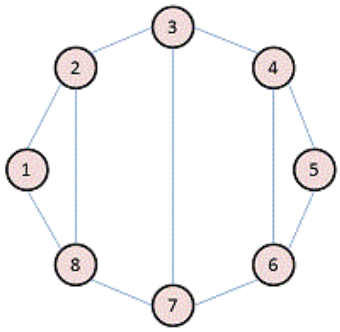
Communities

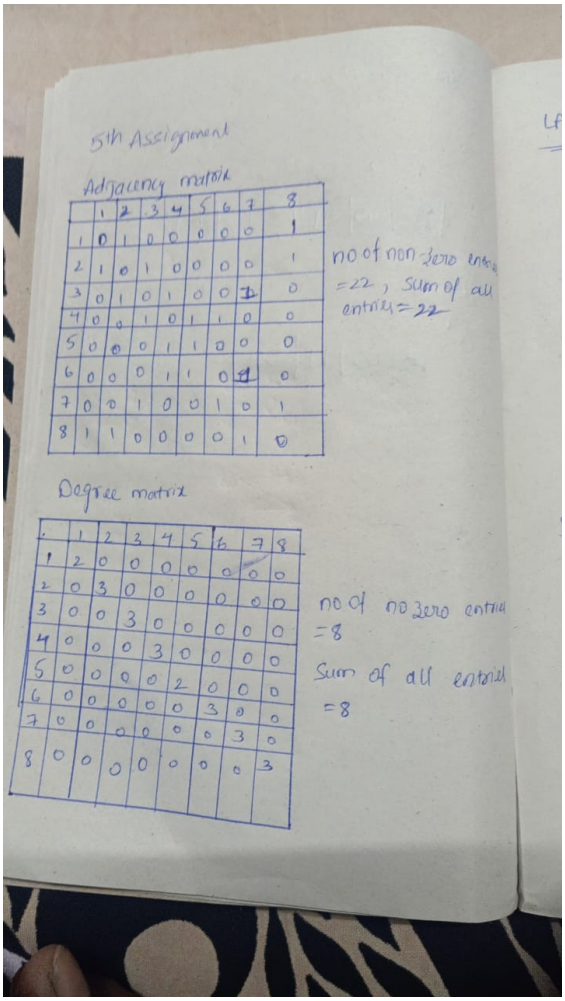
Question 1:

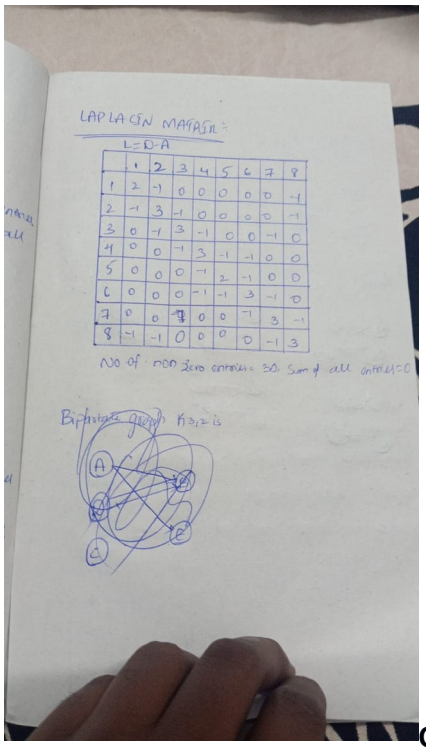
For the following graph:



Write the adjacency matrix A, the degree matrix D, and the Laplacian matrix L. For each, find the sum of all entries and the number of nonzero entries.

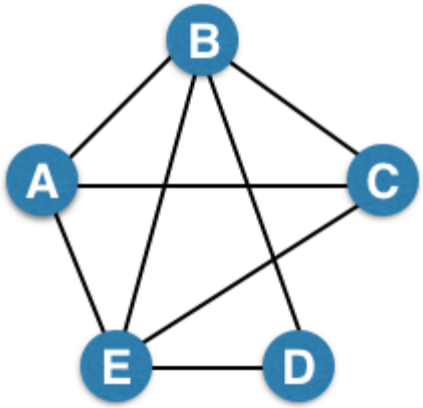
Solution:





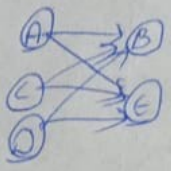
Question 2:

Consider the following undirected graph (i.e., edges may be considered bidirectional):

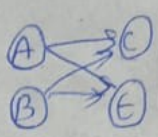


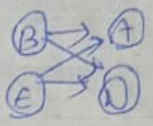
Run the "trawling" algorithm for finding dense communities on this graph and find all complete bipartite subgraphs of types $K_{3,2}$ and $K_{2,2}$. Note: In the case of $K_{2,2}$, we consider {{W, X}, {Y, Z}} and {{Y, Z}, {W, X}} to be identical.

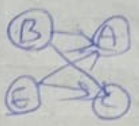
Bipartite $K_{3,2}$:

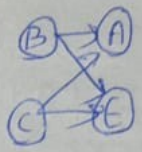


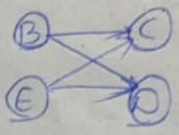
Bipartite $K_{2,2}$:











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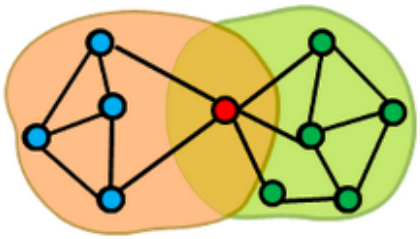
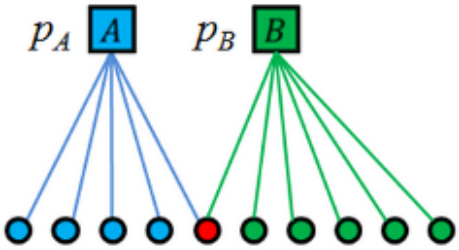
Question 3:

We fit AGM to the network on the left, and found the parameters on the right:



Network



Learned AGM parameters

Find the optimal values for p_A and p_B.

Solution:

Pa = Number of edges in the network / Total possible number of edges = 7 / 5c2 = 7/10.

Pb = Number of edges in the network / Total possible number of edges = 9 / 6c2 = 9/15.