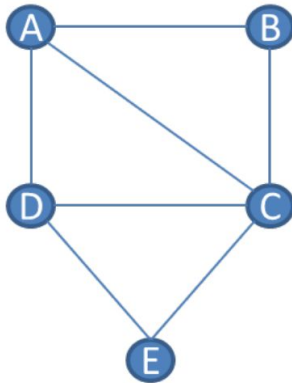


Take home Quiz

- [5 points] For nodes A,B,C, use the Girvan-Newman algorithm to calculate the betweenness of each edge. Write down the edges and their betweenness values in the format below:
 (StartNode, Edge1, Edge2) = Betweenness Value
 You are expected to give 3 sets of values. For each set, assume only 1 start_node(first A, then B, then C) and write the betweenness values corresponding to this node as the root.



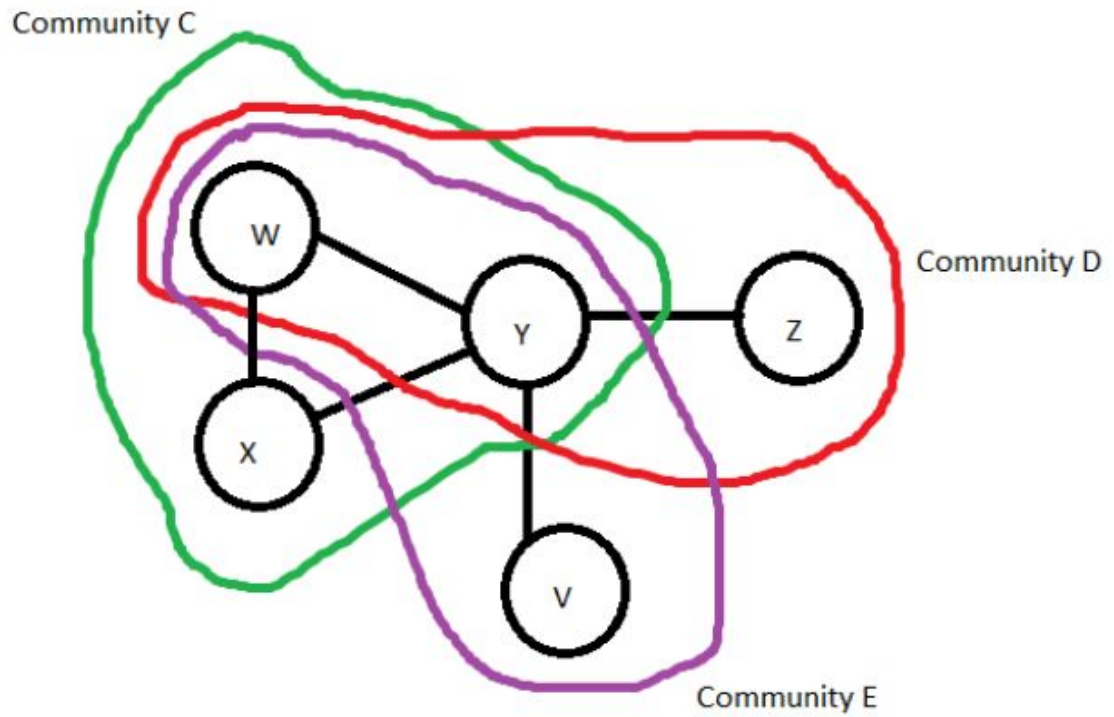
(A, A,B) = 1
 (A, A,C) = 1.5
 (A, A,D) = 1.5
 (A, C,E) = 0.5
 (A, D,E) = 0.5

(B, A,B) = 1.5
 (B, B,C) = 2.5
 (B, A,D) = 0.5
 (B, C,D) = 0.5
 (B, C,E) = 1

(C, A,C) = 1
 (C, B,C) = 1
 (C, C,D) = 1
 (C, C,E) = 1

- [5 points] Given the graph and its community below, write the maximum likelihood equation of this graph in terms of P_c , P_d and P_e , where P_c is the probability that an edge belongs to community C. If any 2 nodes A,B do not share any vertices, Assume, $P_{ab} = (1 - E)$
 Community C - green color
 Community D - red color

Community E - purple color



Answer-

Maximize - $P_{wx} \cdot P_{xy} \cdot P_{vy} \cdot P_{yz} \cdot P_{wy} \cdot (1 - P_{wz}) \cdot (1 - P_{vw}) \cdot (1 - P_{xz}) \cdot (1 - P_{xv}) \cdot (1 - P_{vz})$

I.e., Maximize $P_c \cdot P_c \cdot P_e \cdot P_d \cdot (1 - ((1 - P_c) \cdot (1 - P_d) \cdot (1 - P_e))) \cdot (1 - P_d) \cdot (1 - P_e) \cdot (1 - E) \cdot (1 - E) \cdot (1 - E)$