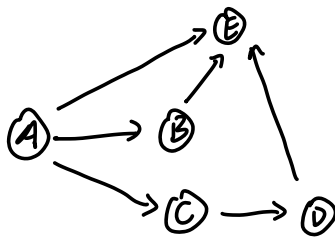


Q3:

a)



b)

I) $K_A K_B K_C K_D K_E$. Since we are having five variables, the total # of states would depend on the multiplication principle, which would be $K_A K_B K_C K_D K_E$

II) $(K_A - 1) + K_A(K_B - 1) + K_A(K_C - 1) + K_C(K_D - 1) + K_A K_B K_D(K_E - 1)$. For each factor, say $P(A)$, we only need $K_A - 1$ parameters to model since all parameters of $P(A)$ should sum up to 1. For $P(B|A)$, we would model $(K_B - 1)$ parameters over all possible K_A states, which leads to $K_A(K_B - 1)$ in total. The rest is similar.

$$c) \prod_{i=1}^N [P(r_i)] \prod_{j=1}^M [P(\sigma_j) \left[\prod_{k=1}^L P(\mu_k) P(x_{ijk} | \mu_k, \sigma_j, r_i) \right]]$$