Exercise 1

1. Draw the Bayesian Network representing the joint distribution

$$P(A, B, C, D, E, F, G, H) = P(A)P(B|A)P(C)P(D|B)P(E)P(F|A)P(G|D, F)P(H|E, B).$$

2. Indicate whether the following statements on conditional independence are True or False and motivate your answer.

   a. $A \perp\!\!\!\perp B$

   b. $A \perp\!\!\!\perp C$

   c. $A \perp\!\!\!\perp D|\{B, H\}$

   d. $A \perp\!\!\!\perp E|F$

   e. $G \perp\!\!\!\perp E|B$

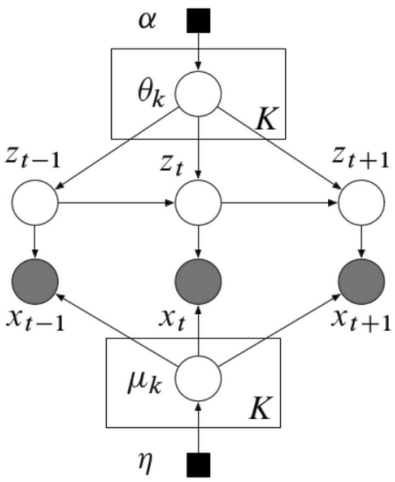
   f. $F \perp\!\!\!\perp C|D$

   g. $E \perp\!\!\!\perp D|B$

   h. $C \perp\!\!\!\perp H|G$

Exercise 2

Build the generative model corresponding to the directed graph



using Dirichlet, Categorical and Normal distributions and supposing that $K = 2$. Then, write a `pyro` implementation of the resulting model.