Bayesian Networks - Sheet 9

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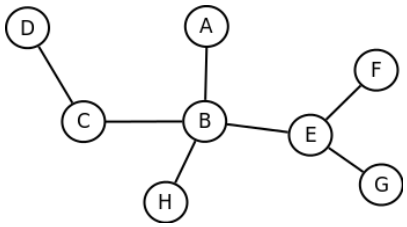
Solutions need to be handed in via learnweb until **Tuesday, December 20th 10:00 AM**

Exercise 1: Inference using cluster trees (10 Points)

Given is the following undirected cluster tree:



In order to do inference, we need to compute link potentials as was shown in the lecture. Which of the following orders of computing the link potentials is possible using lemma 1, and which are not?

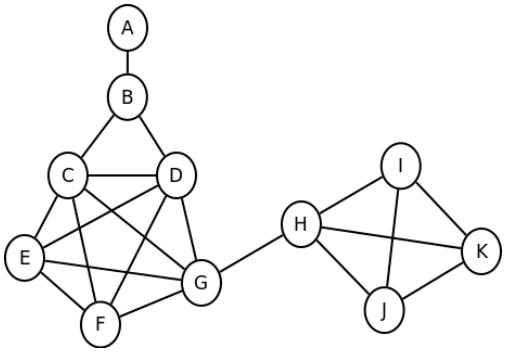
a) $q_{D,C}$; $q_{C,D}$; $q_{A,B}$; $q_{H,B}$; $q_{B,E}$; $q_{G,E}$

b) $q_{D,C}$; $q_{A,B}$; $q_{H,B}$; $q_{F,E}$; $q_{G,E}$; $q_{E,B}$

c) $q_{D,C}$; $q_{A,B}$; $q_{H,B}$; $q_{F,E}$; $q_{E,B}$; $q_{G,E}$

d) $q_{D,C}$; $q_{A,B}$; $q_{H,B}$; $q_{B,E}$; $q_{E,F}$; $q_{E,G}$

e) There are two steps involved in doing the inference, the collect-evidence step and the distribute-evidence step. Using Lemma 2 we need to create a directed rooted tree from the cluster tree given above. Make a scetch of the rooted tree by selecting B as root node. Is the order in which we are computing the link potentials unique? Explain your answer.



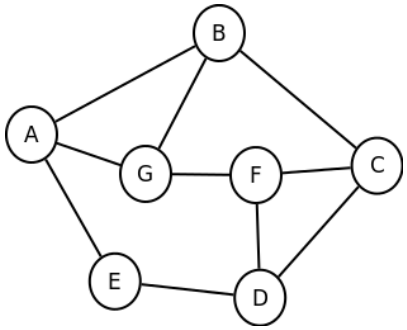
Exercise 2: Triangulation, perfect orderings, cliques (10 Points)

Given is the following graph G:

a) Compute a perfect ordering of G!

b) Compute all cliques which are induced by the perfect ordering. Cross out the ones that are not maximal.

Given is the following non-triangulated graph $\hat{G}$:



c) Compute a perfect ordering of $\hat{G}$!

d) Triangulate $\hat{G}$ and make a scetch of the triangulated graph.