1. (Extra credit, 5 pts). Read Dechter chapter 4 and provide comments on clarity and typos.

2. Consider the Bayesian network in Figure 1.
   (a) Apply BE-bel to obtain the:
      i. marginal probability of variable $F$.
      ii. marginal probability of variable $G$.
      iii. joint marginal probability of variables $F$ and $G$.
   For each part show the schematic computation over buckets (you can take advantage of shared computation). The computation itself can be done manually or using any software tool of your choice.
   (b) Suppose now that the evidence $\{D = 0, C = 1\}$ has been observed. Apply BE-bel to obtain the probability of evidence. You can do calculation by hand or use any software tool to solve the computational parts of this question.
   (c) Explain how BE-mpe can find the most probable explanation (mpe) given the evidence $F=0$. Demonstrate your computation. Again, you can do calculation by hand or use any software tool to solve the computational parts of this question.

3. Question 6.5 in Darwiche
4. Question 6.8 in Darwiche.
5. Given the directed graph $G$ in Figure 2,
   (a) Compute the induced-graph along ordering: $d_1 = F, C, A, G, D, H, E, B$ and the induced-width for each variable. What is $G$’s induced-width along $d_1$?
   (b) Use min-induced width (MIW) to compute an ordering, called $d_2$. Show its ordered graph. Compute the induced-width along $d_2$.
   (c) What is the induced width of the graph $G$? Explain your answer.
   (d) Apply BE-bel along the ordering $d_1$ and show the $\lambda$ functions created, their placement and the expressions for deriving the functions. (optional: do the same for ordering $d_2$)
6. (Question 5.1 in Pearl’s book.) The questions relate to the information in question 3 in Homework 3. (You can run BE manually, or write code for it (matlab) and show the output of the code. Make sure to explain everything you do).

(a) Find the most likely seven-symbol string in $L$ that starts and ends with $\epsilon$.
(b) Find the message most likely to have been transmitted given the string $\epsilon, \epsilon, A, C, A, \epsilon, \epsilon$ is received.

7. (Darwiche 7.1) Answer the following queries with respect to the Bayesian network in Figure (figure 7.18, below):

(a) $P(B; C)$
(b) $P(C; D = true)$. 
(c) \( P(A|D = \text{true}; E = \text{true}) \).

You can prune the network before attempting each computation, and use any inference
method you find most appropriate. (same as above: You can run BE manually, or write
code for it (matlab) and show the output of the code. Make sure to explain everything
you do).

Figure 7.18: A Bayesian network.