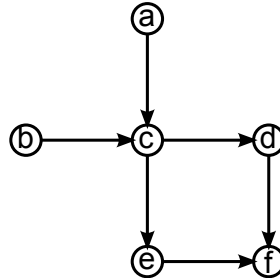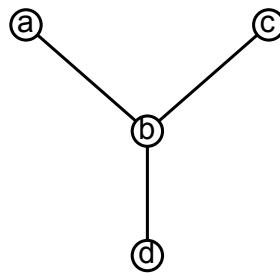# CSE 255, Winter 2015: Homework 5

Instructions

Please submit your solution **at the beginning of the next lecture (February 9)** or outside of CSE 4102 beforehand. Please complete homework **individually**.

Tasks

1. Consider the following graphical model:

   (a) Write down the factorized probability distribution $p(a, b, c, d, e, f)$ implied by this model (1 mark).

   (b) Write down how you would perform summations to efficiently compute $p(f)$ (1 mark).

   (c) Convert the above to an undirected graphical model, and write down the factorization implied by the undirected version (1 mark).
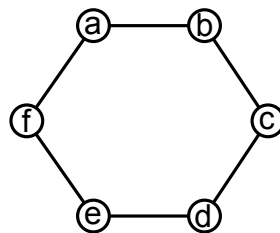
2. Consider the following graphical model:

   Suppose it has potentials

   $$\psi(a,b) = \left[\begin{array}{cc} \psi(0,0) & \psi(0,1) \\ \psi(1,0) & \psi(1,1) \end{array} \right] = \left[\begin{array}{cc} 0.2 & 0.3 \\ 0.1 & 0.9 \end{array} \right]; \quad \psi(b,c) = \left[\begin{array}{cc} 0.1 & 0.2 \\ 0.3 & 0.4 \end{array} \right]; \quad \psi(b,d) = \left[\begin{array}{cc} 0.1 & 0.1 \\ 0.6 & 0.2 \end{array} \right].$$

   Compute $p(c|d = 1)$ (i.e., compute both $p(c = 0|d = 1)$ and $p(c = 1|d = 1)$) (1 mark).

3. Consider the following graphical model:

   Convert the above to a *chordal* graph, keeping its maximal cliques as small as possible, and write down the resulting factorization (1 mark).