CSE 410/510pm: Probabilistic Methods in AI

Homework #4
Due in class on Monday, November 1, 2010

Guidelines: You can brainstorm with others, but please solve the problems and write up the answers by yourself. You may use textbooks (Koller & Friedman, Russell & Norvig, etc.), your notes, and lecture slides from Winter quarter. Please do NOT use any other resources (e.g., online problem solutions) without asking.

Please show enough of your work to make your approach clear.

1. [40 pts] Consider the Bayesian network on the next page. It covers symptoms of colds, whether or not the patient chooses to take medicine for the symptoms, and an alternate cause of sneezing (sunlight). All variables are binary, with distributions defined by the given conditional probability tables. For brevity, just the conditional probabilities of each variable being true (i.e., taking on the value “1”) are given.

(a) What is the Markov blanket of Light in the Bayesian network?

(b) Convert the Bayesian network to an equivalent Markov network using one potential for each maximal clique.

(c) Let $H$ be the graph of this Markov network. What is the Markov blanket of Light in $H$?

(d) Is Light independent of Cold in $H$?


3. [30 pts, Grads only] K&F 5.5

4. [10 pts, Extra credit] K&F 4.18