Assignment 4
CIS 471/571 Introduction to Artificial Intelligence, Fall 2018
due 11:59 pm, Wednesday, November 14th

1. Given the full joint distribution shown in Figure 13.3, calculate the following

   a. $\mathbf{P}(cavity)$
   b. $\mathbf{P}(catch)$
   c. $\mathbf{P}(toothache \mid catch)$
   d. $\mathbf{P}(cavity \mid toothache \vee catch)$

2. We have a bag of three biased coins a, b, and c with probabilities of coming up heads of 40%, 50%, and 60%, respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins), and then the coin is flipped three times to generate the outcomes X_1, X_2, and X_3.

   a. Draw the Bayesian network corresponding to this setup and define the necessary CPTs.
   b. Calculate which coin was most likely to have been drawn from the bag if the observed flips come out heads twice and tails once.

3. Consider the Figure 18.3 but exclude the "Hungry" information/attribute. Other information keeps the same. Build a decision tree using information gain and report your results including all steps to build the tree. (Hint, you'd better write a program to calculate information gain).

To turn in by Canvas/emails: If you are in **CIS 471**, submit your answers on **Canvas**. If you are in **CIS 571**, email to **dou@cs.uoregon.edu**. We prefer that you send in a pdf file. If you are using Word, you should be able to convert your word file to a pdf file.