1. Compute $P(A|C)$ (assuming $A$ is independent of $C$ given $B$) from the following distributions and show your intermediate calculations (i.e., show the intermediate tables you produce) [2 points]:

$$P(A|B) = \begin{array}{c|c|c} A & B & Pr \\ \hline T & T & .1 \\ T & F & .7 \\ F & T & .9 \\ F & F & .3 \end{array}$$

$$P(B|C) = \begin{array}{c|c|c} B & C & Pr \\ \hline T & T & .6 \\ T & F & .5 \\ F & T & .4 \\ F & F & .5 \end{array}$$

$$P(C) = \begin{array}{c|c} C & Pr \\ \hline T & .2 \\ F & .8 \end{array}$$

2. (a) Let $X_1, \ldots, X_n$ be $n$ i.i.d. observations of a distribution with known mean $\mu$ and standard deviation $\sigma$. (b) Derive the formula for the standard deviation of the sample mean of $X_1, \ldots, X_n$ and express this formula in terms of the quantities mentioned in (a). (c) What happens to the formula in (b) as $n \to \infty$? (d) Assume you have a sample of $n$ heights of males aged 25. Describe in words what the standard deviation $\sigma$ and the formula in (b) tell you about these heights. [2 points]

3. (a) What is a good variable ordering (consider the first var in your list to be the first to be eliminated) for variable elimination (VE) with the query $P(\text{MaryCalls}|\text{JohnCalls}=\text{true})$ in the boolean network at the right? What is a bad one? Explain why. (b) For an arbitrary Bayes net (not necessarily the one at right) and fixed evidence, are the big-O computational complexities of (i) an MPE query and (ii) a marginal query over all non-evidence variables different – yes or no? Briefly in words, why or why not? [1 point]
4. In the code repository linked from the course web page for this assignment, checkout the cs536 branch (use Google for github resources if you are not familiar with git). In src/prob/bn/BN.java, complete method varElim and submit just the snippet for this method in your assignment PDF. [5 points]