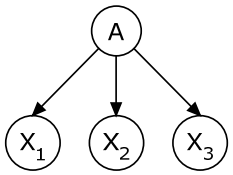
Intro to Artificial Intelligence

Assignment 5

Due: Next week section.

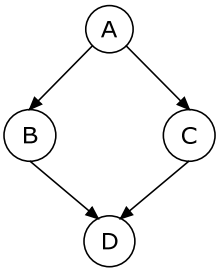
1. Given P(A)=0.5, P(B|A)=0.2. Calculate P(B|¬A). (Answer = 0.2)

2. Consider the following network, where the P(A)=0.5, $\forall i$ P(X_i|A)=0.2, P(X_i|¬A)=0.6. Calculate P(A|X_1, X_2, ¬X_3) (Answer = 0.1818)



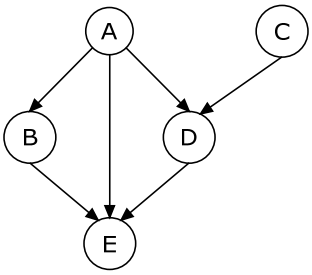
3. Consider the previous network, calculate P(X_3|X_1) (Answer = 0.5)

4. Consider the following Bayes network, find out whether the following statements are true or false. (*Note: ⊥ means independent*)



	Yes	No
B ⊥ A	☐	☐
B ⊥ C | D	☐	☐
B ⊥ C | A	☐	☐
B ⊥ C | A, D	☐	☐

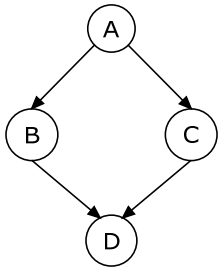
5. Consider the following Bayes network, find out whether the following statements are true or false. (*Note: ⊥ means independent*)



	Yes	No
C ⊥ E | A	☐	☐
B ⊥ D | C,E	☐	☐
A ⊥ C | E	☐	☐
A ⊥ C | B	☐	☐

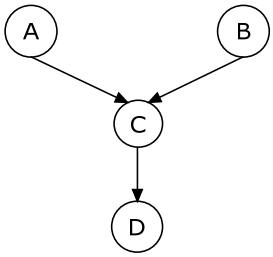
6.In the previous Bayes net, How many parameters are necessary to specify the joint distribution of all variables.

7. Consider the following Bayes net:



a. How many parameters are necessary to compute the joint distribution of all variables.
b. Specify the parameters required to compute the joint distribution of all variables.
c. Write the appropriate rule to calculate the joint distribution using the enumeration method.
d. Adapt your answer in C to reduce the amount of calculation using the Bulling out variables technique.
e. Reorder the previous network using "Maximize independence technique", and state whether your answer will help to reduce number of parameters or not.

8. Consider the following Bayes net



Given:

P(+a)=0.2, P(+b)=0.4,
P(+c|+a,+b)=0.8, P(+c|+a,-b)=0.6, P(+c|-a,+b)=0.5, P(+c|-a,-b)=0.1,
P(+d|+c)=0.7, P(+d|+c)=0.3

Calculate P(+d) using "variable elimination technique"