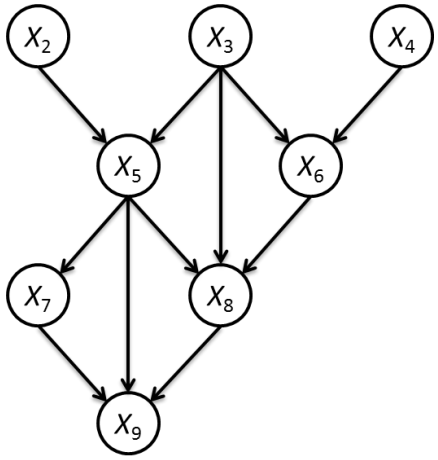
CS480 – Assignment 6
Assigned: Friday, 11/1/2019
Due: 9:59pm (Chicago) on Sunday, 11/10/2019
Please submit your solutions through blackboard assignment page.

1. We are given the following Bayesian network over X_2, X_3, …, X_9. Note that there is no X_1.



a. What is the Bayesian network factorization of the joint P(X_2, X_3, …, X_9)?

b. Assume X_i can take i possible values (for e.g., X_2 is binary, X_3 can take on 3 possible values, …, X_9 can take on 9 possible values)

i. What is the number of independent parameters required to represent the full joint using the naïve table representation? Show your work.

ii. What is the number of independent parameters required for this network? Show your work.

c. For each of the following independence statements, indicate whether it is True or False.

i. $X_2 \perp X_3$

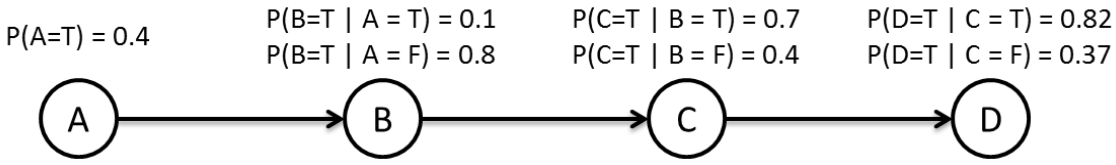
ii. $X_2 \perp X_3 \mid X_8$

iii. $X_2 \perp X_3 \mid X_6$

iv. $X_2 \perp X_4 \mid X_9$

v. $X_7 \perp X_6$

2. We are given the following Bayesian network. Please compute the requested probabilities using variable elimination.

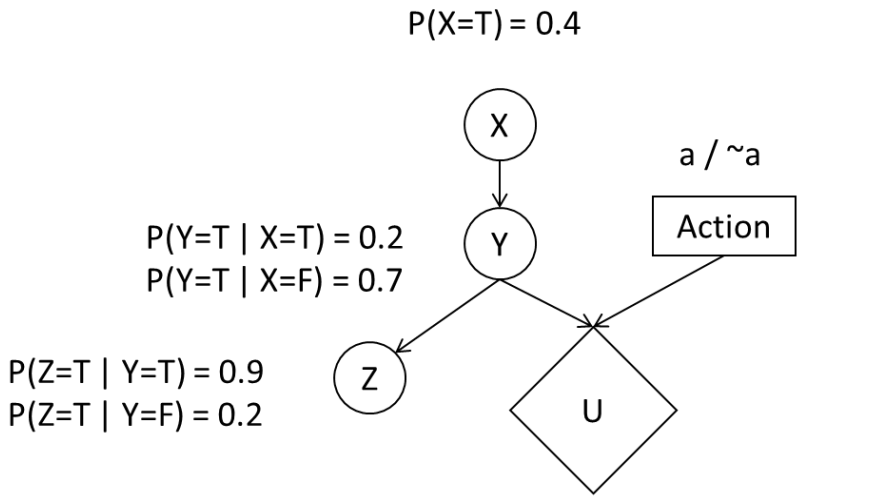


a. P(B)

b. P(C|A=T)

c. P(A, B | C=T, D=F).

3. We are given the following decision network.



Y	Action	U(Y, Action)
T	a	800
T	~a	400
F	a	200
F	~a	1000

a. What action should you take?

b. What is the value of information of Z?

c. What is the value of information of X?

d. Given Z=T, what is the value of information of X?