

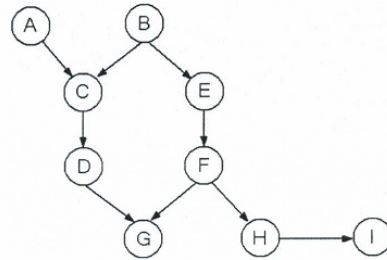
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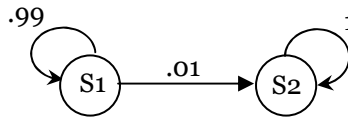
**Statistical Pattern Recognition (CE-725)  
Department of Computer Engineering  
Quiz #8 (Bayesian net & HMM)- Spring 2012**

**1.(40 Points)** The following figure shows a Bayesian net with 9 variables, all of which are binary. Which of the following statements are always true?

- a. ....  $P(A,B | G) = P(A|G) P(B|G)$
- b. ....  $P(A, I) = P(A) P(I)$
- c. ....  $P(B, H|E, G) = P(B| E,G) P(H|E,G)$
- d. ....  $P(C| B,F) = P(C,F)$



**2. (60 points)** Consider the following HMM with observations {1, 2, 3, 4}:



	S1	S2
$P(x=1)$	0	0.1
$P(x=2)$	0.199	0
$P(x=3)$	0.8	0.7
$P(x=4)$	0.001	0.2

- a. Give an example of an output sequence of length 2 which cannot be generated by the Model. Justify your answer.
- b. We generated a sequence of 139100 observations from the HMM, and found that the last observation in the sequence was 3. What is the most likely hidden state corresponding to that last observation?
- c. Now, consider an output sequence {3, 4, 3}. What are the first two states of the most likely hidden state sequence?