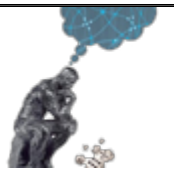
Coursera Dong-Bang T



Probabilistic Graphical Models

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Feedback — Sampling Methods

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You achieved a score of 8.00 out of 8.00

Question 1

Forward Sampling. One strategy for obtaining an estimate to the conditi using forward sampling to estimate $P(\mathbf{y}, \mathbf{e})$ and $P(\mathbf{e})$ separately and the use the Hoeffding Bound to obtain a bound on both the numerator and th large. When does the resulting bound provide meaningful guarantees? T between the true value and our estimate. Recall that we need $M \geq \frac{ln(2/}{2\epsilon^2}$ ϵ that holds with probability $1 - \delta$ for our estimate.

Your Answer		Score	Explanation
It provides a meaningful guarantee, but only when ϵ is small relative to $P(\mathbf{e})$ and $P(\mathbf{y}, \mathbf{e})$	✔	1.00	True. When ϵ isn't small with the value of the estimated ra from the true value of $P(\mathbf{y}\|\mathbf{e}$ ϵ and hence the absolute er $P(\mathbf{y}, \mathbf{e})$ is small.
Total		1.00	

Question 2

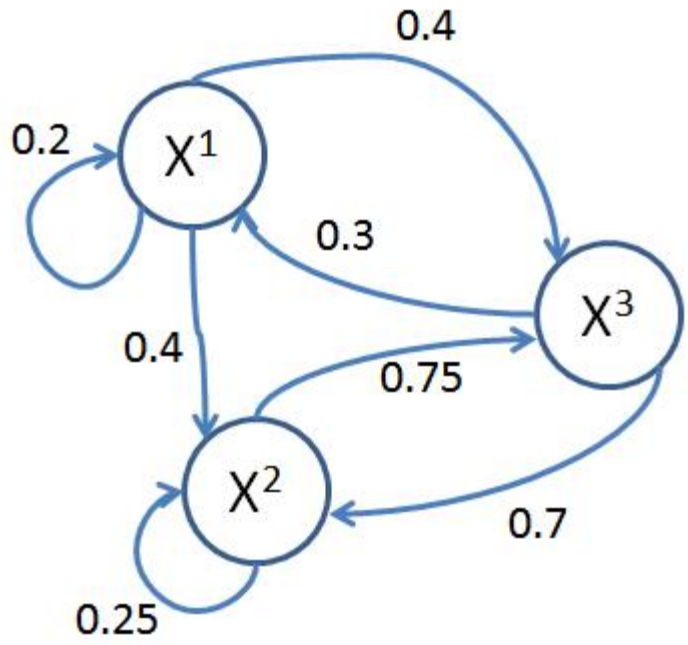
Rejecting Samples. Consider the process of rejection sampling to gene distribution $P(X \mid e)$. If we want to obtain M samples, what is the expect would need to be drawn from $P(X)$?

Your Answer	Score	Explanation

$M/P(e)$	✔	1.00	This is correct because it accounts for the sa don't agree with the evidence and end up wi be the total number of samples. Then probal $P(e)$. Therefore, $M = P(e) * A$.
Total		1.00	

Question 3

Stationary Distributions. Consider the simple Markov chain shown in th stationary distribution π for this chain must satisfy which of the following more options (or none of them, if you think none apply).



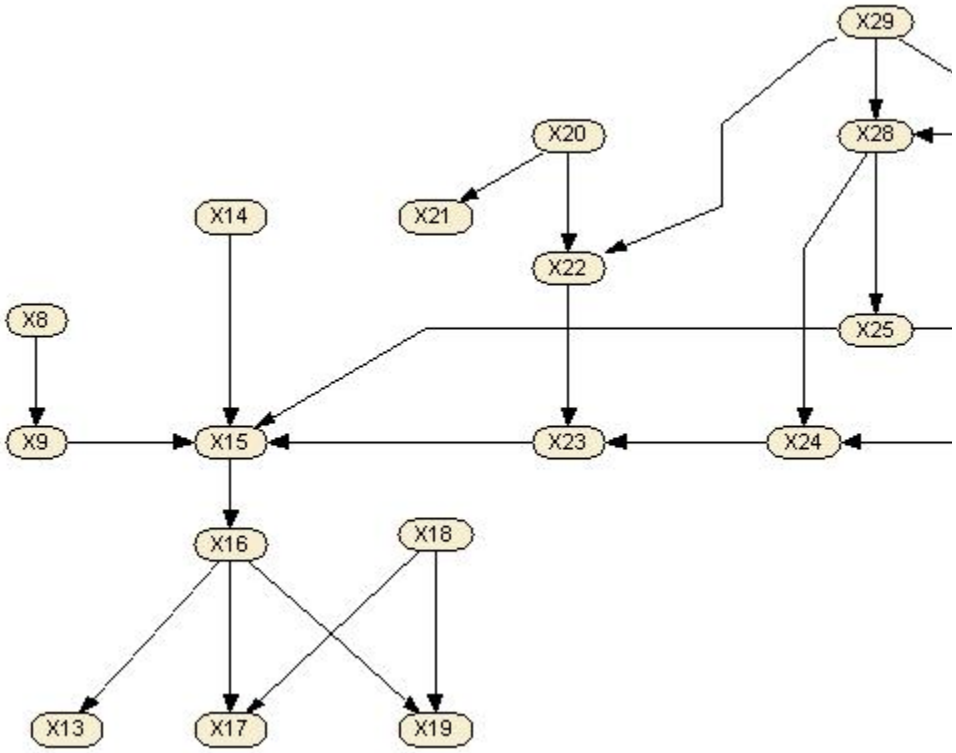
Your Answer

☐ $\pi(x_3) = 0.4\pi(x_1) + 0.5\pi(x_2)$	✔
☑ $\pi(x_1) + \pi(x_2) + \pi(x_3) = 1$	✔
☐ $\pi(x_1) = 0.2\pi(x_1) + 0.4\pi(x_2) + 0.4\pi(x_3)$	✔
☐ $\pi(x_1) = \pi(x_2) = \pi(x_3)$	✔
☐ $\pi(x_3) = 0.3\pi(x_1) + 0.7\pi(x_3)$	✔

☑ $\pi(x_1) = 0.2\pi(x_1) + 0.3\pi(x_3)$	✔	
Total		

Question 4

***Gibbs Sampling in a Bayesian Network.** Suppose we have the Bayes below. If we are sampling the variable X_{23} as a substep of Gibbs sampl equation for the distribution we should use over the value x_{23}'? By close computation such as summations are tractable and that we have access extra computation.



Your Answer		Score
◉ $\frac{P(x_{23}'\|x_{22},x_{24})P(x_{15}\|x_{23}',x_{14},x_9,x_{25})}{\sum_{x_{23}''}P(x_{23}''\|x_{22},x_{24})P(x_{15}\|x_{23}'',x_{14},x_9,x_{25})}$	✔	1.00
Total		1.00

$P(x_{23}' \mid x_{-23})$ is correct but not in closed form because we don't have get it, we have to expand it, and since all factors involving variables not

out (see equation 12.23 in Chapter 12.3.3), we get the correct answer. (

Question 5

Gibbs Sampling. Suppose we are running the Gibbs sampling algorithm $X \rightarrow Y \rightarrow Z$. If the current sample is $\langle x_0, y_0, z_0 \rangle$ and we sample y as t sampling process, with what probability will the next sample be $\langle x_0, y_1,$

Your Answer		Score	Explanation
$P(y_1 \mid x_0, z_0)$	✔	1.00	For Gibbs Sampling, we select one va constant to compute the conditional pr sampled given all the other variables.
Total		1.00	

Question 6

Collecting Samples. Assume we have a Markov chain that we have run now wish to collect samples and use them to estimate the probability tha use every sample from the Markov chain after the burn-in?

Your Answer		Score	Explanation
Yes, that would give a correct estimate of the probability. However, we cannot apply the Hoeffding bound to estimate the error in our estimate.	✔	1.00	This is correct be the collected san stationary (poste bound cannot be samples from the
Total		1.00	

Question 7

Markov Chain Mixing. Which of the following classes of chains would y mixing time in general?

Your Answer		Score	Expla
Markov chains where state spaces are well connected and transitions between states have high probabilities.	✔	1.00	This i able t you a
Total		1.00	

Question 8

Metropolis-Hastings Algorithm. Assume we have an $n \times n$ grid-struct $X_{i,j}$. Let $\mathbf{X_i} = \{\mathbf{X_{i,1}}, \ldots, \mathbf{X_{i,n}}\}$ and $\mathbf{X_{-i}} = \mathcal{X} - \mathbf{X_i}$. Consider the Metropolis-Hastings algorithm: at each step, we take our current assignm inference to compute the conditional probability $P(\mathbf{X_i} \mid \mathbf{x_{-i}})$. We then s distribution, and use that as our proposal. What is the correct acceptance

Your Answer		Score	Explanation
1	✔	1.00	This is (block) Gibbs sampling, where we sar simultaneously from their conditional distribut Gibbs sampling is an instance of MH that has 1.
Total		1.00	