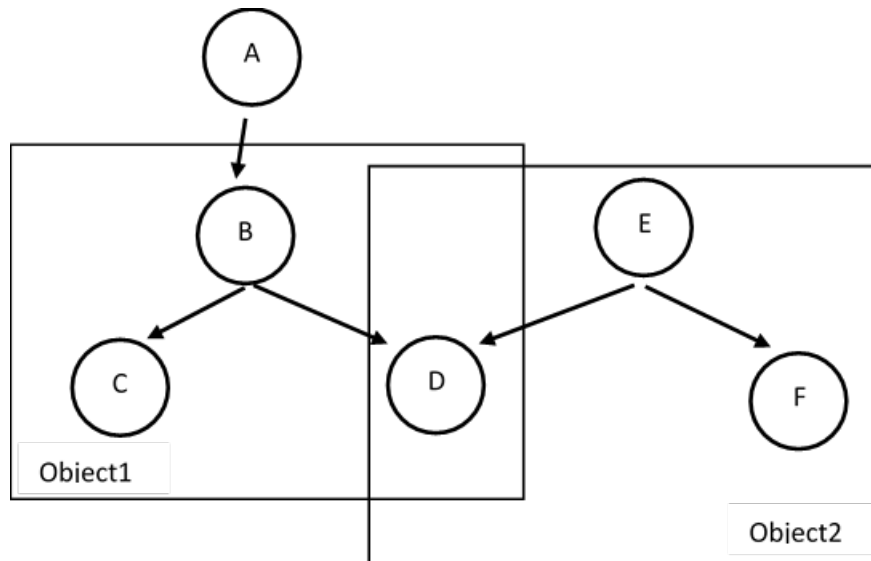


NAME:

CS 583 – Assignments 3
100 points

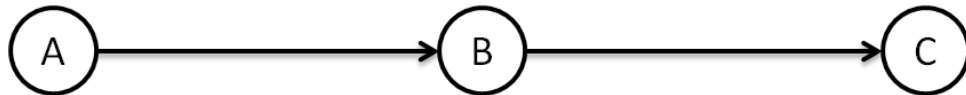
1. [25 pts] Here is a plate model.



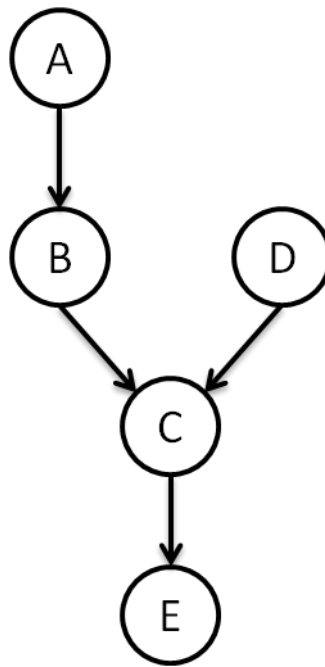
- What probability distributions do we need to specify for this model?
- Draw an unrolled version of the Bayesian network, where there are three items of type Object1 and two items of Object2 type.

2. [25 pts] For the following linear chain, please calculate the requested probabilities using variable elimination. You can use any order you like. Show your work.

A	P(A)	A	B	P(B A)	B	C	P(C B)
T	0.4	T	T	0.3	T	T	0.9
F	0.6	T	F	0.7	T	F	0.1
		F	T	0.8	F	T	0.4
		F	F	0.2	F	F	0.6



- [10 pts] $P(C)$
 - [10 pts] $P(C|A=t)$
 - [5 pts] $P(C|A=t, B=t)$
3. [25 pts] You are modeling the relationship between a set of N input vectors X_1, \dots, X_N and a set of N binary outcomes Y_1, \dots, Y_N . We assume there is a single vector of parameters β which dictates the relationship between each input vector and its associated output variable. In this model, each output is drawn with $Y_n \sim \text{Bernoulli}(\text{invLogit}(X_n\beta))$. Additionally, the vector β has a prior, given by $\beta \sim \text{Normal}(\mu, \Sigma)$. This model is called Bayesian Logistic Regression. Draw its corresponding plate notation.
4. [25 pts] For the following Bayesian network, perform variable elimination to compute $P(E)$. Fill in the table.



Variable	All Factors	Participates	New Factor After *	New Factor After +
A				
B				
D				
C				