

## Homework 6

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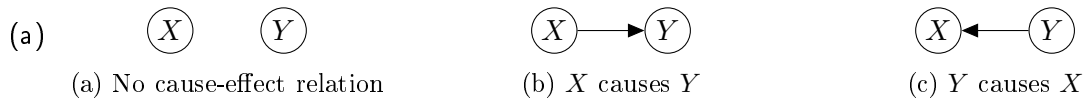
**Problem 1.****Problem 2.****Solution:**

Figure 1: Two nodes Causal Bayesian Networks

(b) For the Causal Bayesian Networks in Figures 1a, 1b and 1c respectively we have:

$$p(X, Y) = p(X)p(Y) \quad (1)$$

$$p(X, Y) = p(Y|X)p(X) \quad (2)$$

$$p(X, Y) = p(X|Y)p(Y) \quad (3)$$

(c) For the Causal Bayesian Networks in Figures 1a and 1c respectively we have:

$$p(Y|X) = p(X)p(Y) \quad (4)$$

$$p(Y|X) = \frac{p(X|Y)p(Y)}{p(X)} = \frac{p(X|Y)p(Y)}{\sum_Y p(X|Y)p(Y)} \quad (5)$$

while  $p(Y|X)$  is already a term of the factorization for the graph in Figure 1b.

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