

Tutorial Solution: The Spanning Tree Algorithm

1.

	a1	a2
b1	2	1
b2	2	3

	b1	b2
c1	2	4
c2	1	1

	a1	a2
c1	2	4
c2	2	0

2.

	a1	a2	P(B)
b1	.25	.125	.375
b2	.25	.375	.625
P(A)	.5	.5	

	b1	b2	P(C)
c1	.25	.5	.75
c2	.125	.125	.25
P(B)	.375	.625	

	a1	a2	P(C)
c1	.25	.5	.75
c2	.25	0	.25
P(A)	.5	.5	

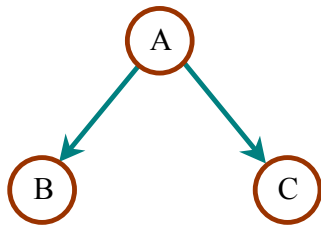
3.

$$\text{Dep}(A,B) = 1/4$$

$$\text{Dep}(B,C) = 1/8$$

$$\text{Dep}(A,C) = 1/2$$

4.



5.

$$P(b1|a1) \quad P(b1|a2) \quad = \quad 0.5 \quad 0.25$$

$$P(b2|a1) \quad P(b2|a2) \quad = \quad 0.5 \quad 0.75$$

$$P(c1|a1) \quad P(c1|a2) \quad = \quad 0.5 \quad 1$$

$$P(c2|a1) \quad P(c2|a2) \quad = \quad 0.5 \quad 0$$

6.

Both the data and the tree give the same result:

$$P(a1 \& b1 \& c1) = 1/8$$

$$P(a2 \& b2 \& c1) = 3/8$$

7.

$$P(a1 \& b1 \& c1) = 0.1$$

$$P(a2 \& b2 \& c1) = 0.45$$

In this case the tree does not model the data exactly.

8. No, the new dependency values are:

$$\text{Dep}(A,B) = 5/64$$

$$\text{Dep}(B,C) = 1/32$$

$$\text{Dep}(A,C) = 1/8$$