

Probabilistic Graphical Models

Quiz 1

January 31, 2020

Directions

- ▶ Keep bags, mobiles and other items outside or near the board.
- ▶ No additional sheets will be given.
- ▶ No doubts on the questions will be entertained. Make reasonable assumptions and proceed.
- ▶ Any event of copying will result in 0 marks for the persons involved.

Q1. Consider the distribution

$$p(t_1, t_2, y_1, y_2, h) = p(y_1 | t_1, h)p(y_2 | t_2, h)p(t_1)p(t_2)p(h)$$

1. Draw a Belief Network for this distribution. (1)
2. Can the distribution $p(t_1, t_2, y_1, y_2) = \sum_h p(y_1 | t_1, h)p(y_2 | t_2, h)p(t_1)p(t_2)p(h)$ be written as a ('non-complete') Belief Network? (2)
3. Show that for $p(t_1, t_2, y_1, y_2)$ as defined above $t_1 \perp y_2 | \emptyset$. (2)

Q2. Consider the distribution $p(a, b, c, d) = \phi_{ab}(a, b)\phi_{bc}(b, c)\phi_{cd}(c, d)\phi_{da}(d, a)$

where the ϕ are potentials.

1. Draw a Markov Network for this distribution. (1)
2. Explain if the distribution can be represented as a ('non-complete') Belief Network. (3)
3. Derive explicitly if $a \perp c | \emptyset$. (1)

Thanks