CS 161 HW 5

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1a)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| T | T | T | T | T |
| T | F | F | T | T |
| F | T | T | F | F |
| F | F | T | T | T |

ANSWER: Neither

1b)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| T | T | T | T | T | T |
| T | T | F | T | T | T |
| T | F | T | F | F | T |
| T | F | F | F | F | T |
| F | T | T | T | T | T |
| F | T | F | T | T | T |
| F | F | T | T | F | F |
| F | F | F | T | T | T |

ANSWER: Neither

1c)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| T | T | T | T |
| T | T | F | T |
| T | F | T | T |
| T | F | F | T |
| F | T | T | T |
| F | T | F | T |
| F | F | T | T |
| F | F | F | T |

ANSWER: Valid

2a)

2b)

2c) 1&6

1&4

3&5

8&9

4&6

5&6

3&12

6&10

We cannot prove that the unicorn is Mythical.

3a)

P(O) = 0.5

P(G) = 0.2

|  |  |  |
| --- | --- | --- |
| **O G** | **T** | **P(T|O,G)** |
| T F | T | 0.9 |
| F T | T | 0.3 |
| F F | T | 0.1 |

3b)

4a)

4b)

4c)

4d) A and B are independent so you can multiply as follows

A and E are independent so we know that

E is dependent on B, so

4e) A is conditionally independent of all nodes

B is conditionally independent of all nodes

C is conditionally independent of all nodes except for A

D is conditionally independent of all nodes except for A and B

E is conditionally independent of all nodes except for B

F is conditionally independent of all nodes except for C and D

G is conditionally independent of all nodes except for F

H is conditionally independent of all nodes except for E and F

4f) The Markov blanket for D is

4g)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |
| T | T | T | 0.5 | T | T | 0.1 | T | T | T | T | 0.5\*0.1 = 0.05 |
| T | T | F | 0.5 | T | F | 0.9 | T | T | T | F | 0.5\*0.9 = 0.45 |
| T | F | T | 0.6 | F | T | 0.9 | T | T | F | T | 0.5\*0.1 = 0.05 |
| T | F | F | 0.4 | F | F | 0.1 | T | T | F | F | 0.5\*0.9 = 0.45 |
| F | T | T | 0.1 |  |  |  | T | F | T | T | 0.6\*0.9 = 0.54 |
| F | T | F | 0.9 |  |  |  | T | F | T | F | 0.6\*0.1 = 0.06 |
| F | F | T | 0.8 |  |  |  | T | F | F | T | 0.4\*0.9 = 0.36 |
| F | F | F | 0.2 |  |  |  | T | F | F | F | 0.4\*0.1 = 0.04 |
|  |  |  |  |  |  |  | F | T | T | T | 0.1\*0.1 = 0.01 |
|  |  |  |  |  |  |  | F | T | T | F | 0.1\*0.9 = 0.09 |
|  |  |  |  |  |  |  | F | T | F | T | 0.9\*0.1 = 0.09 |
|  |  |  |  |  |  |  | F | T | F | F | 0.9\*0.9 = 0.81 |
|  |  |  |  |  |  |  | F | F | T | T | 0.8\*0.9 = 0.72 |
|  |  |  |  |  |  |  | F | F | T | F | 0.8\*0.1 = 0.08 |
|  |  |  |  |  |  |  | F | F | F | T | 0.2\*0.9 = 0.18 |
|  |  |  |  |  |  |  | F | F | F | F | 0.2\*0.1 = 0.02 |

4h)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| T | T | T | 0.05+0.05 = 0.1 |
| T | T | F | 0.45+0.45 = 0.9 |
| T | F | T | 0.54+0.36 = 0.9 |
| T | F | F | 0.06+0.04 = 0.1 |
| F | T | T | 0.01+0.09 = 0.1 |
| F | T | F | 0.09+0.81 = 0.9 |
| F | F | T | 0.18+0.72 = 0.9 |
| F | F | F | 0.08+0.02 = 0.1 |