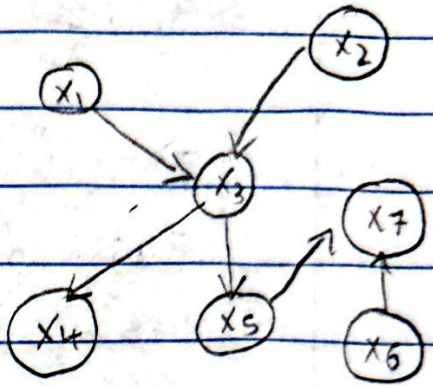
fall 2014
Midterm -2

Question 1]



a) $P(x_1) = f(x_1)$ -

$P(x_2) = f(x_2)$ -

$P(x_3|x_1,x_2) = f(x_1, x_2, x_3)$ -

$P(x_4|x_3) = f(x_3, x_4)$ -

$P(x_5|x_3) = f(x_5, x_3)$ -

$P(x_6) = f(x_6)$

$P(x_7|x_6,x_5) = f(x_7, x_5, x_6) = \text{constant}$

Eliminate x_3

$$\sum_{x_3} f(x_1, x_2, x_3) f(x_3, x_4) f(x_5, x_3)$$

$$\Rightarrow g(x_1, x_2, x_4, x_5) \quad - (1)$$

Eliminate x_1

$$\sum_{x_1} g(x_1, x_2, x_4, x_5) f(x_1) = g'(x_2, x_4, x_5) -$$

Eliminate x_2

$$\sum_{x_2} g'(x_2, x_4, x_5) f(x_2) = g''(x_4, x_5) -$$

Eliminate x_4

$$\sum_{x_4} g''(x_4, x_5) = g'''(x_5)$$

Eliminate x_5

$$\sum_{x_5} g'''(x_5) \Rightarrow \text{gone}$$

Eliminate $x_6 \Rightarrow$ gone

b] Time complexity = $O(d^5)$ (for step ①)

Space complexity = $O(4d^4)$

$(4d4)$

c] A better order would be

Similare $(x_1, x_2, x_4, x_5, x_3, x_6)$

should give time complexity $O(d^2)$