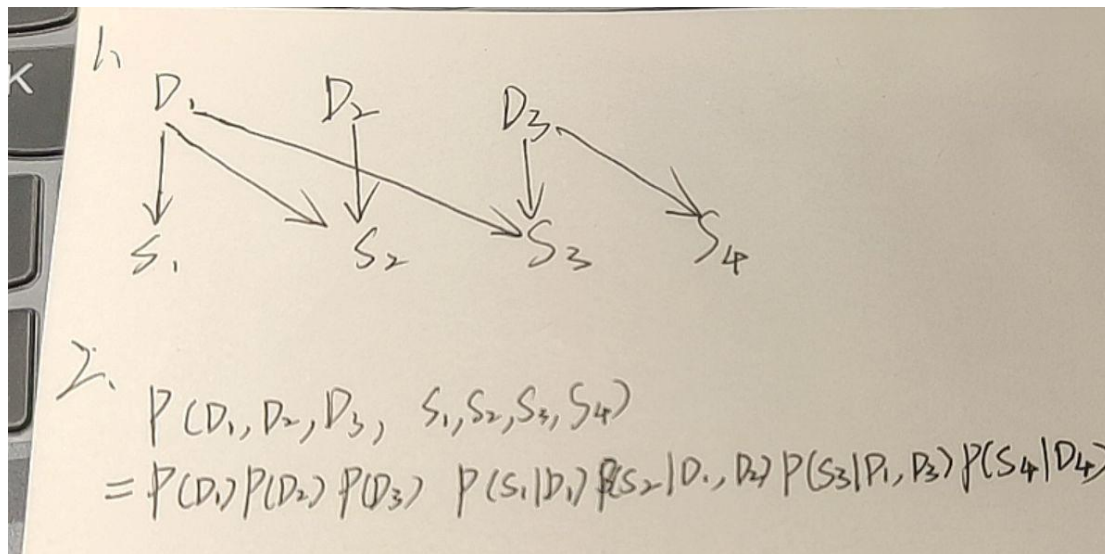
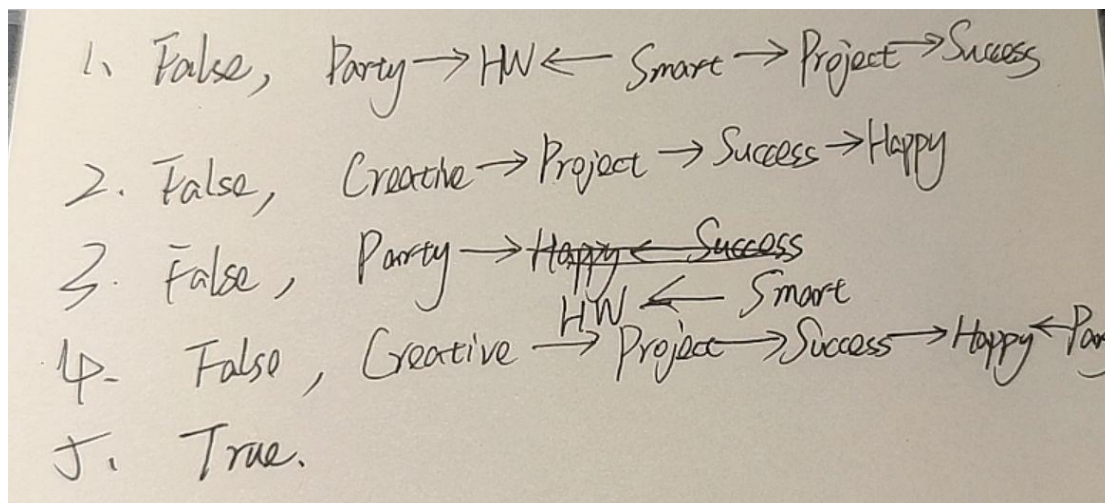


Network Basics



D-Separation



Inference

$$\begin{aligned}
 1. & P(A=F, B=F, C=F, D=F, E=F) \\
 &= P(A=F) P(B=F) P(C=F) P(D=F|A=F, B=F) \\
 &\quad P(E=F|B=F, C=F) \\
 &= 0.8 \times 0.5 \times 0.2 \times 0.1 \times 0.8 \\
 &= 0.0064
 \end{aligned}$$

$$\begin{aligned}
 2. & P(A=F|B=T, C=T, D=T, E=T) \\
 &= \frac{P(A=F, B=T, C=T, D=T, E=T)}{P(B=T, C=T, D=T, E=T)} \\
 &= \frac{P(A=F) P(B=T) P(C=T) P(D=T|A=F, B=T) P(E=T|B=T, C=T)}{P(B=T, C=T, D=T, E=T)} \\
 &= \frac{0.8 \times 0.5 \times 0.8 \times 0.6 \times 0.3}{0.064} \\
 &= 0.96
 \end{aligned}$$

Variable Elimination

1. Eliminate X_1

X_3	X_2	$P(X_3 X_2)$
0	0	0.78
1	0	0.22
0	1	0.49
1	1	0.59

Eliminate X_2

X_3	$P(X_3)$
0	0.622
1	0.378

Eliminate X_3

X_4	$P(X_4)$
0	0.4792
1	0.5208

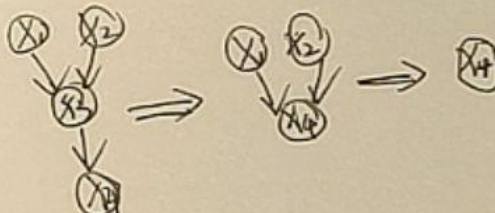


2. Eliminate X_3

X_4	X_1	X_2	$P(X_4 X_1, X_2)$
0	0	0	0.4
0	0	1	0.22
0	1	0	0.16
0	1	1	0.61
1	0	0	0.6
1	0	1	0.78
1	1	0	0.84
1	1	1	0.69

Eliminate X_1, X_2

X_4	$P(X_4)$
0	0.4792
1	0.5208



3. 24 and 16

So Eliminate X_1 first.