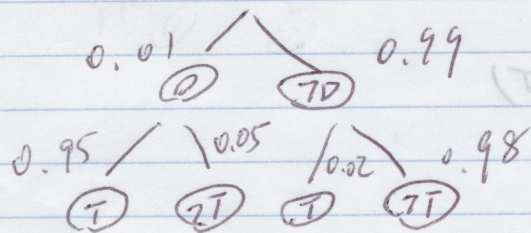


1. All Head: 1  
 1 tail: 1  
 $\vdots$   
 $n$  {  
 $n+1$  tail: 1

1)

$$P = \frac{n+1}{2^n}$$

2)

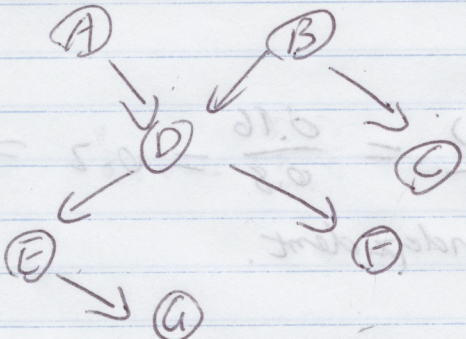


$$P(D|T) = \frac{P(D \cap T)}{P(T)}$$

$$= \frac{0.01 \cdot 0.95}{0.01 \cdot 0.95 + 0.99 \cdot 0.02}$$

$$= \frac{95}{293}$$

3)



$$\begin{aligned} \text{a) } P(A=T, B=T, C=T, D=T, E=T, F=T, G=T) \\ &= P(A) \cdot P(B|A) \cdot P(C|A \cap B) \cdot P(D|A \cap B \cap C) \cdot P(E|A \cap B \cap C \cap D) \cdot P(F|A \cap B \cap C \cap D \cap E) \cdot P(G|A \cap B \cap C \cap D \cap E \cap F) \\ &= 0.45 \cdot P(C|A \cap B \cap C) \cdot P(D|A \cap B \cap C) \cdot P(E|A \cap B \cap C \cap D) \cdot P(F|A \cap B \cap C \cap D \cap E) \cdot P(G|A \cap B \cap C \cap D \cap E \cap F) \\ &= 0.45 \cdot 0.78 \cdot 0.7 \cdot P(D|A \cap B \cap C) \cdot 0.2 \\ &= 0.45 \cdot 0.78 \cdot 0.7 \cdot 0.5 \cdot P(C|A \cap B) \\ &= 0.45 \cdot 0.78 \cdot 0.7 \cdot 0.5 \cdot 0.377 \cdot 0.2 \cdot 0.5 \\ &= 0.4631 \cdot 10^{-3} \end{aligned}$$



$$\begin{aligned}
 b) P(C=D, A=F, B=T) \\
 &= P(C=D | A \cap B) \\
 &= 0.15 \cdot 0.5 \cdot 0.2 \\
 &= 0.015
 \end{aligned}$$

$$\begin{aligned}
 c) P(C=T, D=T) \\
 &= P(C=T) \cap P(D=T) \\
 &= \frac{1}{2} \cdot \frac{1}{2} \\
 &= \frac{1}{4}
 \end{aligned}$$

$$\begin{aligned}
 &P(C=T, D=T) \\
 &= P(C=T, D=T, B=T) + P(C=T, D=T, B=F) \\
 &= P(C=T, D=T, B=T, A=T) + P(C=T, D=T, B=T, A=F) \\
 &\quad + P(C=T, D=T, B=F, A=T) + P(C=T, D=T, B=F, A=F) \\
 &= 0.377 \cdot 0.5 \cdot 0.2 \cdot 0.5 + 0.377 \cdot 0.15 \cdot 0.2 \cdot 0.5 + \\
 &\quad 0.412 \cdot 0.9 \cdot 0.8 \cdot 0.5 + 0.412 \cdot 0.277 \cdot 0.8 \cdot 0.5 \\
 &= 0.2184746
 \end{aligned}$$

$$4) a) P(B|A) = \frac{P(B \cap A)}{P(A)} = \frac{0.16}{0.8} = 0.2 = P(B)$$

A and B are independent.

$$b) \neg A \cap \neg B = 0.8 \cdot 0.2 = 0.16$$

$$1 - \neg A \cap \neg B = A \text{ OR } B = 0.84$$

1. --- 10.

1	5, 6, 7, 8, 9, 10
2	6, 7, 8, 9, 10
3	7, 8, 9, 10
4	8, 9, 10
5	9, 10
6	10

5)

$$\begin{aligned} & \frac{1}{10} \left( \frac{5}{10} + \frac{4}{10} + \frac{3}{10} + \frac{2}{10} + \frac{1}{10} \right) \cdot 2 \\ &= \frac{1}{10} \cdot \frac{15}{10} \cdot 2 \\ &= \frac{3}{10} \end{aligned}$$

6)

$$\begin{aligned} P &= \frac{{}^4C_{13}}{{}^4C_{52}} = \frac{73 \cdot 12 \cdot 11 \cdot 10}{52 \cdot 51 \cdot 50 \cdot 49} = \frac{11}{4165} \end{aligned}$$

7)

$$a) \frac{{}^1C_4}{{}^1C_{52}} = \frac{1}{13}$$

$$b) P(-, ACE) = \frac{1}{13}$$

8)

$$\begin{aligned} & P(\text{BLUE} | \text{BLUE}) \\ &= \frac{P(\text{BLUE} \cap \text{BLUE})}{P(\text{BLUE})} \\ &= \frac{\frac{3}{10}}{\frac{7}{10}} = \frac{3}{7} \end{aligned}$$