1)

S. No.	Outlook	Play
1.	Rainy	Yes
2.	Sunny	Yes
3.	Overcast	Yes
4.	Overcast	Yes
5.	Sunny	No
6.	Rainy	Yes
7.	Sunny	Yes
8.	Overcast	Yes
9.	Rainy	No
10.	Sunny	No
11.	Sunny	Yes
12.	Rainy	No
13.	Overcast	Yes
14.	Overcast	Yes

~~Class~~ x = (sunny)

Construction of frequency table

Class Label	Outlook			total
	Rainy	Sunny	Overcast	
Yes	2	3	5	10
No	2	2	0	4

Step 1: Compute $P(C_K)$ $K = 1, 2$

$P(Yes) = \frac{10}{14}$ $P(NO) = \frac{4}{14}$

Step 2: Construction of conditional probability table

Class lable	outlook		
	Rainy	Sunny	Overcast
Yes	2/10	3/10	5/10
No	2/4	2/4	0

Step 3: Compute conditional probability of C_K given X

$P(C_K|x) = ?$ $K=1, 2$

$P(Yes|Sunny) = P(sunny|yes) \times P(yes)$

$= \frac{3}{10} \times \frac{10}{14} = \frac{3}{14} = 0.2142$

$P(No|sunny) = P(sunny|NO) \times P(NO)$

$= \frac{2}{4} \times \frac{4}{14} = \frac{2}{14} = 0.1428$

Step 4: Maximum C_K, $K=1, 2$

$P(Yes|sunny) = 0.2142$ ✓ $P(NO|sunny) = 0.1428$

Step 5: So if the weather is sunny, then the player should play (Yes).

3) $P(B_1) = \frac{1}{3}$ $\quad P(B_2) = \frac{2}{3}$

let C_1 be cadbury chocolate

let C_2 be Amul chocolate.

let C_3 be Nestle chocolate.

$P(C_1|B_1) = \frac{6}{11}$ $\quad P(C_2|B_1) = \frac{5}{11}$

$P(C_1|B_2) = \frac{3}{11}$ $\quad P(C_3|B_2) = \frac{8}{11}$

$P(B_1|C_1) = ?$ To find the probability of selecting a cadbury chocolate from box 1:

$$P(B_1|C_1) = \frac{P(C_1|B_1)\cdot P(B_1)}{P(C_1|B_1)\cdot P(B_1) + P(C_2|B_1)\cdot P(B_1) + P(C_1|B_2)\cdot P(B_2) + P(C_3|B_2)\cdot P(B_2)}$$

$$= \frac{\frac{6}{11}\times\frac{1}{3}}{\frac{6}{11}\times\frac{1}{3} + \frac{5}{11}\times\frac{1}{3} + \frac{3}{11}\times\frac{2}{3} + \frac{8}{11}\times\frac{2}{3}} = \frac{0.1818}{0.1818 + 0.1515 + 0.1818 + 0.4848}$$

$= 0.1818$

The probability of selecting a cadbury chocolate from box 1 = 0.1818

2) Total no. of balls = 5

No. of red balls = 3

No. of blue balls = 2.

To find: the probability of getting both the balls are red.

Bayes theorem

$$P(B|A) = \frac{P(A|B) \cdot P(B)}{P(A)}$$

$p(\text{red}) = \frac{3}{5}$ $\quad p(\text{blue}) = \frac{2}{5}$

$P(\text{getting first red ball}) = \frac{3}{5}$

$P(\text{getting second red ball}) = \frac{2}{4}$

$P(\text{getting both red balls one after other}) = \frac{3}{5} \times \frac{2}{4} = \frac{3}{10}$

The probability of getting both the balls red when drawn one after another $= \frac{3}{10}$

4) let D be ~~A~~ disease and T be test result.

~~R~~ $D=1 \Rightarrow$ person has a disease

$D=0 \Rightarrow$ person does not have a disease.

$T=1 \Rightarrow$ ~~pos~~ test is positive

$T=0 \Rightarrow$ test is negative.

$P(D=1|T=1) = ?$ $$P(D=1|T=1) = \frac{P(T=1|D=1) \cdot P(D=1)}{P(T=1|D=0) \cdot P(D=0) + P(T=1|D=1) \cdot P(D=1)}$$

$P(D=1) = \frac{1}{10^6}$, $P(T=1|D=1) = \frac{99}{100}$

$P(T=1|D=0) = \frac{1}{1000}$ $\quad P(D=0) = 1 - \frac{1}{10^6}$

$$P(D=1|T=1) = \frac{\frac{99}{100} \times \frac{1}{10^6}}{\frac{1}{1000}\left[1 - \frac{1}{10^6}\right] + \frac{99}{100} \times \frac{1}{10^6}}$$

$$= \frac{990 \times \cancel{10^{-8}}}{(999999 + 990) \times \cancel{10^{-8}}}$$

$$= \frac{990}{1000989} = 0.00098902$$

The probability that the person has a disease and the test is positive $= 0.00098902$.