1 Student Information

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Answer 1

a)

Getting at least 1 white ball probability equals to subtracting getting 3 black balls from 1 so: 1 - BBB =1 - $\frac{8}{10}$ $\frac{11}{15}$ $\frac{9}{12}$ $=$ $\frac{42}{75}$=0.56

b)

Getting white ball from each boxes: WWW= $\frac{2}{10}$ $\frac{4}{15}$ $\frac{3}{12}$ $=$ $\frac{1}{75}$ $=$ 0.013

c)

Box 1: $\frac{2}{10}$ $\frac{1}{9}$ $=$ $\frac{1}{45}$

Box 2: $\frac{4}{15}$ $\frac{3}{14}$ $=$ $\frac{2}{35}$

Box 3: $\frac{3}{12}$ $\frac{2}{11}$ $=$ $\frac{1}{22}$

I would choose box 2 since it has greater probability to get 2 white balls.

d)

Since we need to get 2 white balls,we just focus on drawing white balls.Firstly,box 2 has greatest probability with $\frac{4}{15}$,after drawing there remains $\frac{3}{14}$ for box 2 , however ; box 3 has $\frac{3}{12}$ to get white ball.So the order is box 2 - box 3

e)

	0	1	2	3
P(X=x)	0.44	0.4167	0.13	0.013
	WWW	WBB,BWB,BBW	WBB,WBW,BWW	WWW

Expected Value = 0 * 0.44 + 1 * 0.4167 + 2 * 0.13 + 3 * 0.013 = 0.7167

f)

Box 1: $\frac{1}{3}\ \frac{2}{10} = \frac{1}{15}$

Box 2: $\frac{1}{3}\ \frac{4}{15} = \frac{4}{45}$

Box 3: $\frac{1}{3}\ \frac{3}{12} = \frac{1}{12}$

$\frac{BOX1}{BOX1+BOX2+BOX3} = 0.279$

Answer 2

F=Frodo is corrupted S=Sam is corrupted R=Ring is destroyed

a)

P(R | $\overline{S}$)=0.9
P(R | S)=0.5
P(S)=0.1
If we add the probabilities of ring being destroyed where Sam is corrupted and not corrupted,we can find the total probability of ring being destroyed:
P(R)= P($\overline{S}$) * P(R | $\overline{S}$) + P(S) * P(R | S) = 0.86
From Bayes Theorem;
P(S | R) =$\frac{P(R|S)*P(S)}{P(R)} = \frac{0.5*0.1}{0.86}$=0.058

b)

P(F)=0.25
P(D | F)= 0.2
P(D | $\overline{F} \cap \overline{S}$)=0.9
P(D | F ∩ S)=0.05
We need to find the probability that the ring destroyed both Sam and Frodo are corrupted :
P(F ∩ S | D)
From Bayes Theorem:
P(F ∩ S | D) =$\frac{P(D|F \cap S)*P(F \cap S)}{P(D)}$
P(F ∩ S)=P(F)*P(S) since these are independent events. P(F ∩ S)=0.25*0.1=0.025
P(D)=P(D | F)*P(F)+P(D | S)*P(S)-P(D | F ∩ S)*P(F ∩ S)+P(D | $\overline{F} \cap \overline{S}$)*P($\overline{F} \cap \overline{S}$)
P(D)=0.2*0.25+0.5*0.1-0.05*0.025+0.9*0.75*0.9=0.70625
By using Inclusion-Exclusion Principle P(D | F ∩ S)*P(F ∩ S) part is subtracted to avoid calculating intersection part twice.
When we use these values in Bayes Theorem we can find P(F ∩ S | D).
P(F ∩ S | D)=$\frac{0.05*0.025}{0.70625}$=0.018

Answer 3

a)

We can see that there are only 2 cases that conform 4 snowy days :
P(A=2, I=2)=0.2 or P(A=3, I=1)=0.12 from the law of probability;
P(A=2, I=2) + P(A=3, I=1) = 0.32

b)

	P(A=1)	P(A=2)	P(A=3)	P(A=a)
P(I=1)	0.18	0.3	0.12	0.6
P(I=2)	0.12	0.2	0.08	4
P(I=i)	0.3	0.5	0.2	1

Events A and B are independent if occurrence of B does not affect the probability of A.From the table we can infer that $P(A|B)=P(A)$ and $P(A \cap B)=P(A)P(B)$ for all values of A and B.Hence we can say that snowy days in Ankara and Istanbul are independent.