# Assignment 1

Group 25

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$Sol^n 1$ :

Two dice are rolled,
total possibilities = 36
probability of getting sum is 5,
P(sum=5) = 4/36
P(sum=5) = 1/9

$Sol^n 2$ :

Die is rolled and coin is tossed,
Total possibility = 6
P(odd) = 3/6 = 1/2
P(head) = 1/2
p(odd $\cap$ head) = 1/4

$Sol^n 3$ :

Total = 1, 2, 3, 4, 5

(a) P(Odd at first time) = 3/5

(b) P(odd at second time) = P(even, then odd) + P(odd, then odd)
= 2/5 * 3/4 + 3/5 * 2/4
= 3/10 + 3/10
= 3/5

(c) P(Odd, Both times) = 3/5 * 2/4 = 3/10

$Sol^n 4$ :

No. of teams = 16
No. of rounds = 4
Matches played = 14

(a) P(A wins) = 5/6 * 5/6 * 5/6 * 5/6 = 625/1296

(b) P(A runner up) = 5/6 * 5/6 * 5/6 * 1/6 = 125/1296

(c) P(A reach semi Final) = 5/6 * 5/6(1/6 + 5/6 *1/6 + 5/6 * 5/6) = 25/36

(d) P(A out in round 2) = 5/6 * 1/6 = 5/36

$Sol^n 5$ :

3 coins tossed,

Total Possibilities = 8

(a) Exactly 2 tails,

P(T=2) = 3/8

(b) Atleast 1 tail,

P(T≥1) = 7/8

$Sol^n 6$ :

Two dice thrown,
Total possibilities= 36
Getting a multiple of 2 on one and a multiple of 3 on the other,
Total Cases = 6

P(S) = 6/36 = 1/6

$Sol^n 7$ :

Bolts = 50, Rusted Bolts = 25
Nuts = 150, Rusted Nuts = 75
P(Rusted) = 100/200 = 1/2
P(Bolt) = 50/200 = 1/4
P(Rusted ∩ Bolt) = 25/200 = 1/8

P(Rusted ∪ Bolt) = P(Rusted) + P(Bolt) - P(Rusted ∩ Bolt)

P(Rusted ∪ Bolt) = 1/2 + 1/4 - 1/8 = 5/8

$Sol^n 8$ :

Total = 200 (1.....200)

Divisible by 6 or 8

P(Divisible by 6) = 33/200
P(Divisible by 8) = 25/200
P(Divisible by 6 and 8) = 8/200

P(Divisible by 6 $\cup$ by 8) = P(/6) + P(/8) - P(/6 $\cap$ /8)

P(Divisible by 6 $\cup$ by 8) = 33/200 + 25/200 - 8/200 = 1/4

$Sol^n 9$ :

Two dice are rolled,
Neither divisible by 3 nor 4
Total Possibilities = 16

P(not 3 $\cap$ not 4) = 1 - P(3 $\cup$ 4) $^c$
= 1 - 20/36 = 16/36

$Sol^n 10$ :

Die is rolled twice
Total Possibilities = 36

(a) Getting an even no in the first time or a total of 8
let, E = Even no in first time
P(E) = 18/36 = 1/2

F = Total of 8

P(F) = 5/36

P(E $\cap$ F) = 3/36

P(E $\cup$ F) = P(E) + P(F) - P(E $\cap$ F)
= 18/36 + 5/36 - 3/36 = 5/9

(b) Getting an even no in first time and a total of 8)

P(E $\cap$ F) = 3/36

$Sol^n 11$ :

Rolling 6 sided Die thrice,

P(Getting different number each time) = 6/6 * 5/6 * 4/6 = 5/9

$Sol^n 12$ :

Total Cases = 20

Let E = No. of die in left hand is greater than sum of no of die in right hand

P(E) = 20/216 = 5/54

$Sol^n 13$ :

Red = 5, Blue = 6, Green = 8

Set of 3 balls is randomly selected,

(a) Getting of same color,

With replacement

$= ({}^5C_3 * {}^6C_3 * {}^8C_3)/{}^{19}C_3$

without replacement

$= (5*4*3 + 6*5*4 + 8*7*6)/{}^{19}C_3$

(b) Getting of different color,

With replacement

$= (5*6*8)/{}^{19}C_3$

without replacement

$= ({}^5C_1 * {}^6C_1 * {}^8C_1)/19$

$Sol^n 14$ :

Die is rolled 6 times,

Total possibilities = $6^4$

six comes up atleast once

P(6≥1) = 1- atmost once

= 1 - [P(0) + P(1)]

= 1 - $[(5/6)^4]$

$Sol^n 15$ :

P(female) = 0.52

P(CS) = 0.05

P(W ∪ CS) = 0.02

(a) Female, given majoring in CS

P(F—CS) = P(F ∩ CS) / P(CS) = 0.02/0.05 = 2/5

(b) Majoring in CS, given Female

P(CS—F) = P(F ∩ CS) / P(F) = 0.02/0.52 = 2/52

$Sol^n 16$ :

A contains 4 red and 3 black, B contains 5 Red and 4 Black, C contains 4 Red and 4 black

Total Balls = 24

Probability of 3 balls(2 Red, 1 Black)

= (4/7*5/9*4/8) + (4/7*4/9*4/8) + (3/7*5/9*4/8)

= (80 + 64 + 60) / 504 = 204/504 = 51/126

$Sol^n 17$ :

Coin is tossed until head occurs for the first time,

Probability that No. of tosses required is odd

= 1 + 3 + 5 +.....

= H + TTH + TTTTH + .....

= 1/2 + $(1/2)^3$ + $(1/2)^5$ +... Infinite G.P. Series,

= (1/2) / (1-1/4)

= (1/2)/(3/4) = 2/3

$Sol^n 18$ :

Let, Probabiltiy of Saurabh's success = p(E)
Probability of Mangesh's success = P(F)

P(E) = 1/3, P($E^c$) = 2/3
P(F) = 1/5, P($F^c$) = 4/5

1.) Only 1 of them is selected,

= P(E)*P($F^c$) + P($E^c$)*P(F)
= (1/3)*(4/5) + (2/3)*(1/5) = 2/5

2.) Both Selected

P(E ∪ F) = (1/3)*(1/5) = 1/15

3.) Atleast One

P(E∩F) = P(E) + P(F) - P(E ∪ F)
= (1/3) + (1/5) - (1/15)
= 7/15

$Sol^n 19$ :

P(A) = 1/3, P(B) = 2/7, P(c) = 3/8
P($A^c$) = 2/3, P($B^c$) = 5/7, P($C^c$) = 5/8

Only one of them will solve it,

= P(A) P($B^c$) P($C^c$) + P($A^c$) P(B) P($C^c$) + P($A^c$) P($B^c$) P(C)

= (1/3)*(5/7)*(5/8) + (2/3)*(2/7)*(5/8) + (2/3)*(5/7)*(3/8)

= (25+20+30)/(3*7*8)

= 25/26

$Sol^n 20$ :

P(X) = 0.60, P(Y) = 0.40
According to Baye's Theorem,

= (0.4*0.78)/(0.6*0.96 + 0.4*0.78)
= 312/888 = 39/111

$Sol^n 21$ :

Total 10 people seated around a circular table,
Two particular always sit together,

For circular arrangement, Possible combination = (n-1)!

P(E) = (2! * (n-2)!)/(n-1)!
= (2! * 8!)/9! = 2/9

$Sol^n 23$ :

Store(A, B, C) have employees(50, 75, 100) and women(.25, .45, .70)

P(Women and Works in C) = (70/100) / (25/50 + 45/75 + 70/100)

= (7/10) / (5/10 + 6/10 + 7/10)
= 7/18

$Sol^n 24$ :

P(X) = 0.7, P(Y) = 0.5, P($X^c$) = 0.3, P($Y^c$) = 0.5

P(X∪) = 1 - P($X^c \cap Y^c$)
= 1 - 0.60
= 0.40

P(X ∩ Y) = P(X) + P(Y) - P(X∪)
= 0.7 + 0.5 - 0.4

= 0.8

$Sol^n 25$ :

P(Gun hits plane) = P(1) + P($1^c$).P(2)+P($1^c$)P($2^c$).P(3) + P($1^c$).P($2^c$).P($3^c$).P(4)

= 0.4 + 0.6*0.3 + 0.6*0.7.0.2 + 0.6*0.7*0.8*0.1
= 4/10 + 18/100 + 84/1000 + 336/10000

= 6976/10000
= 0.6976

$Sol^n 26$ :

A has 5 Black and 3 White and B has 4 Black and 4 white balls.

To make composition of A equal to B, transfer 1B ball from A to B and then transfer 1W from A to B.

P(E) = (5/8)*(4/9)
= 5/18

$Sol^n 27$ :

REMAINS
Vowels = 3
Position for Vowels = 4

Ways Vowels occurs at Odd places = ${}^4C_3$ * 3! * 4!
= 4*6*24
= 576

$Sol^n 28$ :

RAINBOW

All vowels together = 3! * 5!
= 6*120 = 720

$Sol^n 29$ :

A failing = 0.07
B failing = 0.10
C failing = 0.05

a) P(All work correctly) = (93/100)*(90/100)*(95/100)

b) P(All fail) = (7*10*5)/(100*100*100)
= $35/10^5$

c) P(Only one operates correctly) = $(93*10*5)/10^6 + (7*90*5)/10^6 + (95*10*7)/10^6$

d) P(atleast one Opearte correctly) = 1 - P(No one operates correctly)
= 1 - $35/10^5$

$Sol^n 30$ :

E = Second card will be ace if first card is king

P(E) = (4/52)*(4/51)
= 4/663