Q.1) Max Marks: 1

It is a Poisson variate and P(X=1)=2P(X=2) then P(X=3)=____

A $e^{-1}/6$ Correct Option

Solution: (A)

If X is a poisson variate and P(X=1)=2P(X=2)

$(e^{-\lambda}\lambda^1)/1!=2*(e^{-\lambda}\lambda^2)/2! =\lambda=1$
$P(X=3)= (e^{-1}\lambda^3)/3!=e^{-1}/6.$

B $e^{-2}/2$

C $e^{-1}/2$

D $e^{-1}/3$

Q.2) Max Marks: 1

A bag contains four balls. Two balls are drawn and found them to be white. The probability that all the balls are white is

A **1/2**

B **3/5** Correct Option

Solution: (B)

Let A1, A2, A3 denote the events that the bag contains 2, 3, 4 white balls respectively and E be the event that two white balls are drawn from the bag.
Since A1, A2, A3, are equally likely, we get P(A1) =P(A2)=P(A3)=1/3
P(E | A1)=C(2,2)/C(4,2)=⅙.
P(E | A2)=C(3,2)/C(4,2)=½.
P(E | A3)=C(4,2)/C(4,2)=1.
By Bayes theorem,
P(A3|E) = P(A3)P(E|A3)/(ΣP(Ai)P(E|Ai)) = (⅓)*1/((⅓)*(⅙+½+1))=6/10=⅗.

C **1/4**

D **4/6**

Q.3) Max Marks: 1

For a biased die the probabilities for different faces to turn up are given below.

Face	1	2	3	4	5	6
Probability	0.1	0.32	0.21	0.15	0.05	0.17

The Die is tossed and you are told that either face 1 or 2 has turned up. Then the probability that it is face 1 is

A **5/21** Correct Option

Solution: (A)

Let A be the event that the face 1 turns up and B the event that face 2 turns up.
P(A)=0.1 P(B)=0.32
Since A and B are mutually exclusive P(A∪B)=P(A)+P(B)=0.42
P(A|A∪B)=P(A∩((A∪B))/P((A∪B)=P(A)/P(A∪B)=0.1/0.42=5/21

B **6/23**

C **5/23**

D **None of these**

Q.4) Max Marks: 1

The probabilities of A and B to pass an examination are 2/10, 3/10. The probability that, only one of them, to pass the examination is

A 41/50

B 47/50

C 19/50 — Correct Option

Solution: (C)

Let A be the event that A passes and B be the event that B passes the exam.
Both events A and B are independent of each other.

We need to calculate P((A∩B')∪(A'∩B))=P(A)P(B')+P(A')P(B)=((2/10)*(7/10))+((8/10)*(3/10))
=14/100+24/100
=38/100 =19/50

D 37/50

Q.5) Max Marks: 1

7 boys and 3 girls sit in a row at random. The probability that no two girls sit together is

A 5/14

B 3/28

C 1/26

D 7/15 — Correct Option

Solution: (D)

The total no of ways we can arrange 7 boys and 3 girls in a row is = 10!
No of ways we can arrange such that no two girls are sitting together = 7!*P(8,3)
Required probability=7!*P(8,3)/10!= 7/15.

Q.6) Max Marks: 1

Out of 10 persons sitting at a round table, three persons A, B and C are selected a random. The chance that no two of these are sitting together is

A 7/12

B 7/15

C 5/12 — Correct Option

Solution: (C)

Let E be the event that no two of A, B and C are sitting together.
No of occurrences or no of ways E can occur= 6!*7P3. (7 people are arranged first and in 7 places the 3 are seated in 7P3 ways)
Total no of ways in which we can seat 10 people across a round table is 9!.

Required Probability P(E)=6!*7P3/9!=5/12.

D 5/7

Q.7) Max Marks: 1

A box contains 6 tickets. Two of the tickets carry a price of Rs. 5/- each, the other the price of Rs. 1. If one ticket is drawn, the mean value of the price is

A 14/3

B 7/6

C 1

D 7/3 — Correct Option

Solution: (D)

Let X denote the value of the ticket selected at random from the box.

Range of X is {5, 1}
P(X=5)=2/6=1/3

P(X=1)=4/6=2/3

Mean= 5(1/3) + 1(2/3) = 7/3.

Q.8) Max Marks: 1

Forty identical coins each with probability p of showing heads are tossed. The probability of heads showing on 20 coins is the same as that of heads showing on 21 coins. Then p=

A **10/41**

B **20/41**

C **21/41** Correct Option

Solution: (C)

Sal: P(X= 20)=P(X=21)=C(40,20) p^{20} q^{20}= C(40,21) $p^{21}q^{19}$.
On simplifying we get
(1-p)/20 = p/21 = p=21/41.

D **11/41**

Q.9) Max Marks: 1

The first twelve letters of the English alphabet are written at random in a line. The probability that, there are exactly four letters in between A and B is

A $\frac{5}{66}$

B $\frac{7}{33}$

C $\frac{3}{22}$

D $\frac{7}{66}$ Correct Option

Solution: (D)

The total number of arrangements 12!
In between A and B, four letters can be filled in P(10,4) ways. Treating the 6 letters as a single object. 7 objects can be arranged in 7 ways. In each of these arrangements, A and B can be arranged in 2! Ways.

Required Probability= $\frac{2!*P(10,4)*7!}{12!}$ =7/66

Q.10) Max Marks: 1

There are 10 stations between two cities A and B. A train is to stop at three of these 10 stations. The probability that no two of these three stations are consecutive is

A **7/15** Correct Option

Solution: (A)

We are having a total of 10 stations which can be arranged in 10! Ways.
Out of which 3 are halting and 7 are non-halting stations first we can arrange the 7 stations in 7! ways now the no of ways we can arrange them in P(8,3) ways.
Required probability is given by =(P(8,3)*7!)/(10!)=7/15

B **7/12**

C **7/10**

D **5/7**

Q.11) Max Marks: 2

A random variable X has the following probability distribution:

X	1	2	3	4	5	6	7	8
P(X)	0.15	0.23	0.12	0.10	0.20	0.08	0.07	0.05

For the events E = {X is a prime number} and F {X<4}, the probability P(EUF) is____

A **0.87**

B 0.50

C 0.35

D 0.77 Correct Option

Solution: (D)

P(E)=0.23+0.12+0.20+0.07=0.62
P(F)=0.15+0.23+0.12=0.50
P(E∪F)=0.23+0.12=0.35
P(E∩F)=P(E)+P(F)-P(E∩F) = 0.62+0.5-0.35=0.77

Q.12) Max Marks: 2

Six dice are thrown 729 times. The number of times you expect at least 3 dice to show either 5 or 6 is

A 233 Correct Option

Solution: (A)

P(getting a 5 or a 6 on the die)=2/6=⅓
Probability of 3 successes when 6 dice are thrown= $C(6,3)*(⅓)^3(⅔)^3$ $+C(6,4)*(⅓)^4(⅔)^2+C(6,5)*(⅓)^5(⅔)^1+C(6,6)*(⅓)^6(⅔)^0$233/729.

The required frequency=729*(233/729)=233.

B 249

C 396

D 433

Q.13) Max Marks: 2

A letter is known to have come either from LONDON or CLIFTON; on the address only the two consecutive letters ON are legible. The probability that it has come from London is

A 5/17

B 12/17 Correct Option

Solution: (B)

Let A_1 and A_2 be the event of selecting a pair of consecutive numbers of London and Clifton respectively and E be the event of selecting the pairs of letters "ON".

Then we have $P(A_1∩E)=2/5$ as London has 2 occurrences of "on" and the total no of 2 consecutive letters are 5, similarly $P(A_2∩E)=1/5$.
Now we know that "on" is visible on the address and we need to know the probability that it is from London. $P(A_1|E) = P(A_1∩E)/(P(A_1∩E)+ P(A_2∩E))=(⅔)/((⅔)+(¼))=12/17$

C 17/30

D 3/5

Q.14) Max Marks: 2

The probability of getting at most 4 heads when tossing 7 unbiased coins is

A 57/64

B 99/128 Correct Option

Solution: (B)

No of ways we can get at most 4 heads

No of ways we can get 0 heads + no of ways we can get 1 head + … no of ways we can get 4 heads.

=C(7,0)+C(7,1)+C(7,2)+C(7,3)+C(7,4)=1+7+21+35+35=99
Total no of outcomes=2^7.
=$99/2^7$.

C 5/16

D 1/2

Q.15) Max Marks: 2

Out of 10,000 families with 4 children each, the probability number of families all of whose children are girls is

A 625 Correct Option

Solution: (A)

n=4, p=½ q=½ $P(X=4)=C(4,4)(½)^4(½)^0 =1/16$.

The no of families with all daughters= 10000(1/16)=625.

B 1250

C 2500

D 9375

close