PROBABILITY

To define probability in a clear, concise mathematical language, we require explanation of certain terms. They are:

- **RANDOM EXPERIMENT OR TRIAL (R.E):** An experiment which can be conducted any number of times under essentially identical conditions and the experiment whose possible outcomes or results are known before hand and yet we cannot say which one of the results materialises in a given situation is called a random experiment or trial. For example:
  - Tossing of a coin
  - Rolling of a die
  - Drawing a specified number of cards from a well shuffled pack of 52 playing cards etc.,
- **EVENT:** An outcome or the result of a random experiment is called an event. For example while tossing of a coin we may get head upwards, or tail upwards. Now getting head upwards is an event or getting tail upwards is also an event.

  The event can be either an elementary event or a composite event.

  - **ELEMENTARY EVENT OR INDECOMPOSABLE EVENT:** The possible outcome or the result of a random experiment that can not be split further is called an elementary or simple event. For example:
  - The event of getting head upwards is an elementary event.
  - The event of obtaining a face with 4 points upwards in rolling of a die is an elementary event.
  - **COMPOSITE EVENT:** The possible outcome or the result of a random experiment that can be further split into more than one elementary event is called a composite event. For example:
  - Getting a face with odd number of points upwards in rolling of a die is a composite event, since it can be divided further into three elementary events namely:
  - Event of getting a face with one point upwards.
  - Event of getting a face with three points upwards.
  - Event of getting a face with five points upwards.
  - Getting a face with even number of points upwards in rolling of a die is also a composite event, since it can be divided further into three elementary events namely:
  - Event of getting a face with two points upwards.
  - Event of getting a face with four points upwards.
  - Event of getting a face with six points upwards.

  Briefly speaking a combination of two or more number of elementary events is called a composite event.
  The events whether elementary or composite are denoted by the latin letters A, B, C, D, E, ...
- **MUTUALLY EXCLUSIVE EVENTS (M.E.E.):** The events of a R.E. are said to be M.E. events, if the occurence of any one of them precludes i.e, prevents or eliminates the occurence of all the other events of that R.E.
  Two events A and B are said to be M.E. or disjoint when both cannot happen simultaneously in a single trial or experiment. i.e., $A \cap B = \phi$.
  For example:
  - In tossing of a coin head turning upwards eliminates tail turning upwards in that particular R.E. So head & tail are M.E. events.
  - In rolling of a die the event of getting a face with one point turning upwards eliminates all the other faces turning upwards in that particular R.E. So all the six faces of the die are M.E.

  The events $A_1, A_2, A_3.....A_n$ of a R.E. are said to be M.E. or disjoint events if, $A_i \cap A_j = \phi,$ for $i \neq j$ & $1 \leq i,\ j \leq n$.
  NOTE: When ever it is possible for two or more number of events to happen simultaneously, then those events are said to be compatible.
- **EQUALLY LIKELY EVENTS (E.L.E.):** The events of a R.E. are said to be E.L. When one does not occur more number of times than any one of the other events i.e., if all the events occur same number of times.
  The events of a R.E. are said to be equally likely when there is no reason to expect a particular event in preference to any other event. For example:
  - If an unbiased coin is tossed a large number of times, each face i.e., head and tail can be expected to appear same number of times.
  - If a perfect or symmetrical or uniform die is rolled a large number of times, all the six faces can be expected to appear same number of times.
- **EXHAUSTIVE EVENTS (E.E.):** The events of a random experiment are said to be exhaustive, if the occurence of any one of them is a certainty.
  A set of events is said to be exhaustive if the conduct of the experiment always result in the occurence of at least one of them.
  A set of events is said to be exhaustive, if these include all possible outcomes of the R.E. For example:
  - In tossing of a coin it is certain that either the head will turn upwards or the tail will turn upwards. So head & tail put together are called as exhaustive events.
  - In rolling of a die it is certain that any one of the six faces will turn upwards. So all the six faces of a die put together are called as exhaustive events.
- **SAMPLE SAPCE (S):** The list of all possible outcomes or results of a random experiment is called as sample for that experiment and it is denoted by S. **(or)**
  The set of all possible elementary events in a R.E. or trial is called a sample space for that trial and is denoted by S.
  For example:

- In tossing of a coin, the sample space S is S={H, T}.
- In rolling of a die, the sample space S is S={1, 2, 3, 4, 5, 6}.

Now consider:
A = {1, 3, 5}, the event of getting odd number of points upwards.
B = {2, 4, 6}, the event of getting even number of points upwards.
C = {1, 2}, the event of getting a face with 1 or 2 points upwards.
D = {6}, the event of getting a face with 6 points upwards.
Now A, B, C & D are subsets of S.
From these we can conclude that any subset of a sample space is called an event.

NOTE:
- The empty set ϕ, which is a subset of every set also represents an event and is said to be an impossible event.
- The set S itself is a subset of S and it represents sure or certain event.
- An elementary or simple event of a R.E. is considered as one sample point. So a sample space can also be defined as collection of all possible sample points, each sample point being an elementary event of a R.E.

- **FAVOURABLE CASES:** The possible outcomes or results of a R.E. which entail the occurence of the event A are called as favourable cases for the event A to happen.
The possible outcomes or results of a R.E. which are helpful or responsible for the event A to happen are called as favourable cases for the event A. For example:
  - In rolling of a symmetrical die 1, 3 & 5 are helpful or responsible for the event A, the event of getting odd number of points upwards. So they are called as favourable cases for the event A.
  - In rolling of a symmetrical die 2, 4 & 6 are helpful or responsible for the event of occurence of even number of points upwards B. So they are called as favourable cases for the event B.

CLASSICAL DEFINITION OF PROBABILITY
(OR)
MATHEMATICAL DEFINITION OF PROBABILITY
(OR)
APRIORI PROBABILITY

The probability of the event A, denoted by P(A) is defined as $P(A)=\frac{m}{n}=\frac{n(A)}{n(S)}$.

Where
n = The total number of possible outcomes in a R.E. which are M.E., E.L. & collectively exhaustive.
m = The number of possible outcomes favourable to A in that R.E.
n(S) = The total number of sample points in a sample space S.
n(A) = The number of sample points favourable to A in that sample space S.

p(A) = $\frac{m}{n}$ can also be expressed as

"The odds in favour of the event A are m to n - m or $\frac{m}{n-m}$"

or

"The odds against the event A are n-m to m or $\frac{n-m}{m}$".

But in both the cases $P(A)=\frac{favourable\ cases}{total\ no.\ of\ cases}$

$$=\frac{m}{m+n-m}=\frac{m}{n}$$

Now consider $P(A)=\frac{m}{n}$

If m = 0, P(A) = 0, then A is said to be an impossible event.

If m=n, $P(A)=\frac{n}{n}=1$, then A is said to be a sure or certain event.

$\therefore$ The limits of P(A) are [0, 1]

i.e., $0\le P(A)\le 1\Rightarrow 0\le P(\overline{A})\le 1$

From these we can conclude that the probability of any event is a non-negative rational number which lies between 0 & 1, both inclusive.

LIMITATIONS:

- If n is very very large say ∞ we can not determine the probability of the event A with the help of this definition.
- The probability can not be found when the outcomes are not equally likely.
- When the outcomes are not M.E., our logic may go wrong.
- One of the serious draw backs of this definition is that in defining probability we use the term equally likely i.e., equally probable i.e., probability itself.

VON MISES'S
STATISTICAL DEFINITION OF PROBABILITY
EMPIRICAL DEFINITION OF PROBABILITY
FREQUENCY INTERPRETATION OF PROBABILITY
OR
APOSTERIORI PROBABILITY

Let a trial be repeated independently any number of times under essentially identical conditions and let A be an event of it. Suppose the event A occurs m times out of n trials. Then $\frac{m}{n}$ is called the relative frequency of the event A, denoted by R(A) i.e., $R(A)=\frac{m}{n}$. Now the probability of the event A i.e., P(A) is the limit approached by R(A) as the number of trials n increases indefinitely, provided a unique limit exists.

Symbolically

$$P(A) = \lim_{n\to\alpha} R(A)$$
$$= \lim_{n\to\alpha} \frac{m}{n}$$

LIMITATIONS:

- It is practically impossible to repeat the experiment infinite number of times. So we have to be satisfied in practice by giving a large value for n as far as possible.
- As $\frac{m}{n}$ is not a real variable we cannot determine the value of P(A) with the help of known mathematical methods. To determine $P(A) = \lim_{n\to\alpha}\frac{m}{n}$, we have to make use of the concept of probability.
- All the identical trials are to be conducted independently. Again to define the concept of independence, we require the concept of probability.

AXIOMATIC APPROACH TO PROBABILITY

Let S be a finite sample space associated with a random experiment. Then a real valued function P from the power set of S i.e., P(S) into the real line R is called a probability function on S, if P satisfies the following three axioms.

- **AXIOM OF POSITIVITY:**

  For every subset A of S, $P(A)\geq 0$

  i.e., $P(A)\geq 0, \forall A\in S$
- **AXIOM OF CERTAINTY:**

  P(S) = 1
- **AXIOM OF UNION OR AXIOM OF ADDITIVITY:**

  If A_1, A_2 are two disjoint subsets of S, then $P(A_1\cup A_2)=P(A_1)+P(A_2)$.

  Now the image P(A) of A is called the probability of the event A.

NOTE:

- In general if $A_1, A_2, A_3, ...A_n$ are n disjoint subsets of S, then $P\{A_1\cup A_2\cup A_3\cup ......\cup A_n\}$

  $=P(A_1)+P(A_2)+P(A_3)+....+P(A_n)$

  i.e., $P\left(\bigcup_{i=1}^{n} A_i\right)=\sum_{i=1}^{n} P(A_i)$
- If S consists of n equally likely elementary events and A_i is one such elementary event of S, then $P(A_i)=\frac{1}{n}; i=1,2,3,......n$.

NOTATIONS: Let A and B be two events in a sample space S, then

- $\overline{A}$ or A^C or A' stands for the non-occurence or negation of A.
- $A\cup B$ stands for the occurence of at least one of A & B. i.e., for either the occurence of the event A or B or for the simultaneous occurence of both A & B i.e., $A\cap B$.
- $A\cap B$ stands for the simultaneous occurence of A & B.
- $\overline{A}\cap\overline{B}$ or $A'\cap B'$ or $A^C\cap B^C$ stands for the non-occurence of both A and B.
- $A\subseteq B$ stands for "the occurence of A implies occurence of B".

ADDITION THEOREM: If A and B are any two compatible events in a sample space S, then the probability of occurence of either the event A or B or both the events A & B i.e., the event of $A\cap B$ is given by

$$P(A\cup B)=P(A)+P(B)-P(A\cap B) \quad ....(1)$$

If A and B are M.E. events, $P(A\cap B)=0$, then

$$P(A\cup B)=P(A)+P(B) \quad ....(2)$$

$$P(A\cup B)=P(A)+P(B)-P(A)P(B) \quad ......(3)$$

(or)

$$P(A\cup B)=1-P(A^c)P(B^c)$$

- From equation numbers (1) & (2) we can conclude that $P(A\cup B)\leq P(A)+P(B)$

  Further $A\ \&\ B\subseteq A\cup B$

  $P(A)\ or\ P(B)\leq P(A\cup B)\leq P(A)+P(B)$
- P(exactly one of A, B occurs)

  $=P(A\cup B)-P(A\cap B)$

  $=P(\overline{A}\cup\overline{B})-P(\overline{A}\cap\overline{B})$
- If A & B are two events

  $P(\overline{A}\cup\overline{B})=1-P(A\cap B)$ &

  $P(\overline{A}\cap\overline{B})=1-P(A\cup B)$
- $(A\cap\overline{B})\cup B=A\cup B$ & $(\overline{A}\cap B)\cup A=(A\cup B)$
- For three events A, B & C

  $P(A\cup B\cup C)=P(A)+P(B)+P(C)-P(A\cap B)$

  $-P(A\cap C)-P(B\cap C)+P(A\cap B\cap C)$

If A, B & C are M.E. events, the probabilities of compound events will be zero, then $P(A \cup B \cup C) = P(A) + P(B) + P(C)$

- If A, B & C are three events then
- P(exactly one of A, B, C occurs) = $P(A)+P(B)+P(C)-2P(A \cap B)$ $-2P(A \cap C)-2P(B \cap C)+3P(A \cap B \cap C)$
- P(exactly two of A, B, C occur) = $P(A \cap B)$ $+P(A \cap C)+P(B \cap C)-3P(A \cap B \cap C)$
- P(at least two of A, B, C occurs) = $P(A \cap B)$ $+P(A \cap C)+P(B \cap C)-2P(A \cap B \cap C)$

CONDITIONAL PROBABILITY: If A & B are two events in a sample space S such that $P(A) \neq 0$, then the probability of occurence of B, after the occurence of the event A is called the conditional probability of B given A, denoted by either $P(B/A)$ or $P\left(\frac{B}{A}\right)$ or $P(B;A)$ and is defined as $P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{n(A \cap B)}{n(A)}$.

Similarly if $P(B) \neq 0,$ then

$$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{n(A \cap B)}{n(B)}$$

If A & B are independent, then

$$P(B/A) = P(B) \ \& \ P(A/B) = P(A)$$

- If A and B are M.E. events

  $P(B/A) = 0 \ \& \ P(A/B) = 0$
- In general $P(B/A) \neq P(A/B)$

MULTIPLICATION THEOREM
OR
PRODUCT THEOREM
OR
THEOREM OF COMPOUND PROBABILITY

If A and B are two events in a sample space S such that $P(A) \neq 0 \ \& \ P(B) \neq 0,$ then the probability of simultaneous occurence of the two events A & B is given by $P(A \cap B) = P(A).P(B/A) = P(B).P(A/B)$.

If A & B are independent $P(B/A) = P(B)$ & $P(A/B) = P(A)$, then $P(A \cap B) = P(A).P(B)$.

- For four events A, B, C & D

  $P(A \cap B \cap C \cap D)$

  $= P(A).P(B/A).P(C/A \cap B).P(D/A \cap B \cap C)$

  If A, B, C and D are independent, then

  $P(A \cap B \cap C \cap D) = P(A).P(B).P(C).P(D)$

NOTE:

- If A and B are M.E. events, $P(A \cap B) = 0$.
- If A and B are independent

  $P(A \cap B) = P(A).P(B) \neq 0$.

  From these we can conclude that mutually exclusive events cannot be independent & independent events cannot be mutually exclusive.
- If A & B are independent, $P(A \cap B) = P(A)P(B)$ then $P(A \cup B) = P(A) + P(B) - P(A).P(B)$. or $P(A \cup B) = 1 - P(\overline{A}).P(\overline{B})$.

  If A, B & C are three independent events, then $P(A \cup B \cup C) = 1 - P(\overline{A}).P(\overline{B}).P(\overline{C})$
- If two events A & B are independent
  - $A \ \& \ \overline{B}$ are independent.
  - $\overline{A} \ \& \ B$ are independent.
  - $\overline{A} \ \& \ \overline{B}$ are independent.
- Three events A, B & C are said to be mutually independent if
  - $P(A \cap B) = P(A).P(B)$
  - $P(A \cap C) = P(A).P(C)$
  - $P(B \cap C) = P(B).P(C)$
  - $P(A \cap B \cap C) = P(A).P(B).P(C)$

  Suppose the 1st three conditions (i), (ii) & (iii) are satisfied and the last i.e., (iv) condition is not satisfied, then the three events A, B & C are said to be pair-wise independent.

COMPLEMENTARY EVENTS: If $A \ \& \ \overline{A}$ are two events in a sample space S such that $A \cup \overline{A} = S \ \& \ A \cap \overline{A} = \phi$ then $A \& \overline{A}$ are said to be complementary events.

For example:

In rolling of a die $S = \{1,2,3,4,5,6\}$

Let $A = \{1,3,5\}$, then $\overline{A} = \{2,4,6\}$

Now $A \cup \overline{A} = \{1,2,3,4,5,6\}$ =S

$A \cap \overline{A} = \phi$

The two events namely (1) The event of getting odd number of points upwards & (2) The event of getting even number of points upwards are complementary events.

NOTE: Complementary events are always mutually exclusive events.

Now consider $A \cup \overline{A} = S$, then

$$P\left(A \cup \overline{A}\right) = P(S)$$

$$P(A) + P\left(\overline{A}\right) = 1$$

$\therefore P(A) = 1 - P\left(\overline{A}\right)$; where

$$P\left(\overline{A}\right) = \frac{n\left(\overline{A}\right)}{n(S)}.$$

BAYES THEOREM :

Suppose $E_1, E_2, E_3, ...E_n$ are 'n' mutually exclusive and exhaustive events with $P(E_i) > 0$ for $i = 1, 2, 3.....n$ in a random experiment .Then for any event A of the random experiment

$$P\left(E_k/A\right) = \frac{P(E_k).P\left(A/E_k\right)}{\sum_{i=1}^{n} P(E_i)P\left(A/E_i\right)}$$ for i=1,2,3...n

GEOMETRIC PROBABILITY

Classical definition of probability fails if the total number of outcomes of an experiment is infinite. Then the probability that a point selected in a given region will be in a specified part of it is called geometrical probability or probability in continuous.

Thus the probability P is given by

$$\text{P} = \frac{\text{Measure of specified part of the region}}{\text{Measure of the whole region}}$$

Where measure refers to the length, area volume of the region of we are dealing with one, two or three dimensional space respectively.

NOTE:

1. When 'n' fair coins are tossed the probability of getting exactly 'r' $(\le n)$ heads (tails) = $\frac{{}^nc_r}{2^n}$

2. When 'n' fair coins are tossed the probability of getting atleast one head (tail) = $1 - \frac{1}{2^n}$

3.A coin is tossed (m+n) times (m>n), then the probability of getting at least 'm' consecutive heads is $\frac{n+2}{2^{m+1}}$

4. A coin is tossed (m+n) times (m>n), then the probability of getting exactly 'm' consecutive heads is $\frac{n+2}{2^{m+2}}$

5. The probability of getting a sum of 'S' points when 'n' symmetrical dice are rolled is

$$P(X = S) = \sum_{k=0}^{\frac{s-n}{6}} \frac{(-1)^k .{}^nc_k .{}^{(s-6k-1)}c_{n-1}}{6^n}$$ where

k=0,1,2....$\left[\frac{s-n}{6}\right]$

6. If 'p' and 'q' are the probability of success, failure of a game in which $A_1, A_2, A_3, ...A_n$ play then

i)probability of A_1's winning is $\frac{p}{1-q^n}$

ii)probability of A_2's winning is $\frac{qp}{1-q^n}$

iii)probability of A_k's $(1 \le k \le n)$ winning is $\frac{q^{k-1}.p}{1-q^n}$

7. If 'n' letters are put at random in the 'n' addressed envelopes, the probability that

i) All the letters are in right envelopes is $\frac{1}{n!}$

ii) Exactly one letter in wrong envelope is 0

iii) At least one letter may be in wrongly addressed envelope is $1 - \frac{1}{n!}$

iv) Exactly 'r' $(r \ne 1)$ letters are in wrong envelopes is $\frac{{}^np_r}{n!}\left(1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + ... + \frac{(-1)^r}{r!}\right)$

v) all the letters may be in wrong envelopes is $\frac{{}^np_n}{n!}\left(1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + ... + \frac{(-1)^n}{n!}\right)$

LEVEL- I

1. The probability of an impossible event is

   1. $\frac{1}{2}$ 2. 1 3. 0 4. $\frac{1}{4}$

2. The probability of a certain event is

   1. 0 2. $\frac{1}{2}$ 3. 1 4. $\frac{1}{4}$

3. The probability of an event lies in

1. (0, 1]　2. [0, 1)　3. [0, 1]　4. (0, 1)

4. If A and B are two events in a sample space S such that $P(A) \neq 0$, then $P\left(\frac{B}{A}\right) =$

1. P(A).P(B)　2. $\frac{P(A \cap B)}{P(B)}$

3. $\frac{P(A \cap B)}{P(A)}$　4. P(B)

5. If A and B are any two events in a sample space S then $P(A \cup B)$ is

1. $\geq P(A)+P(B)$　2. P(A) + P(B)

3. $\leq P(A)+P(B)$　4. $P(A \cap B)$

6. If A and B are two mutually exclusive events then $P(A \cap B) =$

1. P(A). P(B)　2. P(A)

3. 0　4. 1

7. If A and B are two mutually exclusive events then $P(A \cup B) =$

1. $P(A)+P(B)-P(A \cap B)$

2. $P(A)-2P(A \cap B)$

3. P(A) + P(B)　4. P(A).P(B)

8. If A and B are independent events then $P\left(\frac{A}{B}\right) =$

1. P(A)　2. $\frac{P(B)}{P(A)}$　3. P(B)　4. P(A).P(B)

9. If A and B are independent events then $P\left(\frac{B}{A}\right) =$

1. P(A)　2. $\frac{P(B)}{P(A)}$　3. P(B)　4. P(A).P(B)

10. If A and B are two events in a sample space S such that $P(A) \neq 0 \text{ and } P(B) \neq 0$, then $P(A \cap B) =$

1. P(A).P(B)　2. $P(A).P\left(\frac{B}{A}\right)$

3. P(B)　4. P(A)

11. If A and B are two independent events in a sample space S then $P(A \cap B) =$

1. $P(A).P\left(\frac{A}{B}\right)$　2. $P(B).P\left(\frac{B}{A}\right)$

3. P(A).P(B)　4. P(A)+P(B)

12. If $A \subset B$, then $P(A \cap B^C) =$

1. 1　2. 0　3. P(A)　4. P(B)

13. If A, B and C are any three events in a sample space S then $P\{A \cap (B \cup C)\} =$

1. $P(A)+P(B)+P(C)-P(A \cap B)-P(A \cap C)$

2. $P(A)+P(B)+P(C)-P(B)P(C)$

3. $P(A \cap B)+P(A \cap C)-P(A \cap B \cap C)$

4. $P(B \cap C)+P(A \cap B)-P(A \cap B \cap C)$

14. P (at least one of the events A or B) =

1. $1-P(A \cap B)$　2. $1-P(\overline{A} \cap \overline{B})$

3. $1-P(A \cup B)$　4. $1-P(A).P(B)$

15. If $P\left(\frac{B}{A}\right) < P(B)$, the relationship between $P\left(\frac{A}{B}\right)$ and P(A) is

1. $P\left(\frac{A}{B}\right) < \frac{1}{2}P(A)$　2. $P\left(\frac{A}{B}\right) > P(A)$

3. $P\left(\frac{A}{B}\right) < P(A)$　4. $P\left(\frac{A}{B}\right) < 2P(A)$

16. If $P\left(\frac{A}{C}\right) > P\left(\frac{B}{C}\right)$ and $P\left(\frac{A}{\overline{C}}\right) > P\left(\frac{B}{\overline{C}}\right)$, then the relationship between P(A) and P(B) is

1. P(A)=P(B)　2. $P(A) \leq P(B)$

3. $P(A) > P(B)$　4. $P(A) \geq P(B)$

17. If E and $\overline{E}$ denote the happening and not happening of an event and $P(\overline{E}) = \frac{1}{5}, P(E) =$

1. $\frac{1}{5}$　2. $\frac{2}{5}$　3. $\frac{3}{5}$　4. $\frac{4}{5}$

18. If A and B are two Mutually Exclusive events in a sample space S such that P(B) = 2P(A) and $A \cup B = S$, then P(A)=

1. $\frac{1}{2}$　2. $\frac{1}{3}$　3. $\frac{1}{4}$　4. $\frac{1}{5}$

19. An experiment yields 3 Mutually Exclusive and exhaustive events A, B and C. If P(A) = 2P(B) = 3P(C), then P(A)=

1. $\frac{1}{6}$　2. $\frac{5}{6}$　3. $\frac{6}{11}$　4. $\frac{5}{11}$

20. If A and B are two events such that P(A) > 0 and $P(B) \neq 1$, then $P(\overline{A}/\overline{B}) =$

1. $1-\frac{P(A \cup B)}{P(\overline{B})}$　2. $1-\frac{P(A \cup B)}{P(B)}$

3. $\frac{1-P(A \cup B)}{1-P(B)}$　4. $\frac{P(A \cup B)}{P(B)}$

21. If A & B are 2 events then $P\{(A \cap \overline{B}) \cup (\overline{A} \cap B)\} =$

1. $P(A \cup B)-P(A \cap B)$　2. $P(A \cup B)+P(A \cap B)$

3. $P(A)+P(B)$　4. $P(A)+P(B)+P(A \cap B)$

22. If A and B are two events such that $P(A)=\frac{1}{4}$; $P(A\cup B)=\frac{1}{3}$ and P(B)=P, the value of P if A and B are mutually exclusive is

1. $\frac{1}{3}$ 2. $\frac{1}{6}$ 3. $\frac{1}{12}$ 4. $\frac{1}{5}$

23. If A and B are two events such that $\mathrm{P}(\mathrm{A})=\frac{1}{4}$ and $P(A\cup B)=\frac{1}{3}$ and P(B)=P, the value of P if A and B are independent

1. $\frac{1}{9}$ 2. $\frac{2}{9}$ 3. $\frac{4}{9}$ 4. $\frac{5}{9}$

24. If the probability of two events E_1 and E_2 in a random experiment are $P(E_1)=0.4, P(E_2)=P$, $P(E_1\cup E_2)=0.7$, the value of P, if E_1 and E_2 are mutually exclusive is

1. 0.1 2. 0.2 3. 0.3 4. 0.5

25. If the probability of two events E_1 and E_2 in a random experiment are $P(E_1)=0.4, P(E_2)=P$, $P(E_1\cup E_2)=0.7$, the value of P, if E_1 and E_2 are independent is

1. 0.3 2. 0.4 3. 0.5 4. 0.2

26. If A and B are two events such that $P(A)=\frac{1}{4}$, $P(A\cup B)=\frac{1}{3}$ and P(B) = P, the value of P if $A\subset B$

1. $\frac{1}{12}$ 2. $\frac{3}{4}$ 3. $\frac{2}{3}$ 4. $\frac{1}{3}$

27. If A and B are two events such that $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$, then $P\left(\frac{B}{\overline{A}}\right)=$

1. $\frac{2}{5}$ 2. $\frac{3}{5}$ 3. $\frac{4}{5}$ 4. $\frac{1}{5}$

28. One of the two events must happen. Given that the chance of one is two-thirds that of the other, find the odds in favour of the other

1. 2 to 3 2. 2 to 5 3. 3 to 2 4. 5 to 2

29. For two independent events $P(A)=\frac{3}{4}$ and $P(B)=\frac{5}{8}$, then $P(A\cup B)=$

1. $\frac{3}{32}$ 2. $\frac{29}{32}$ 3. $\frac{15}{32}$ 4. $\frac{5}{32}$

30. If A and B are two events such that $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$, then $P\left(\frac{A}{\overline{B}}\right)=$

1. $\frac{2}{3}$ 2. $\frac{2}{5}$ 3. $\frac{1}{3}$ 4. $\frac{1}{5}$

31. The results of students of a college revealed the following facts. 25% of students failed in Mathematics, 15% of students failed in Chemistry, 10% of students failed in both. If a student is selected at random. The probability that he has failed in Mathematics, given that he failed in Chemistry is

1. $\frac{1}{5}$ 2. $\frac{2}{3}$ 3. $\frac{3}{5}$ 4. $\frac{1}{3}$

32. In a class 40% of students read History, 25% Civics and 15% both History and Civics. If a student is selected at random from that class, the probability that he reads History, if it is known that he reads Civics is

1. $\frac{1}{5}$ 2. $\frac{2}{5}$ 3. $\frac{3}{5}$ 4. $\frac{3}{8}$

33. A card is drawn from a pack of 100 cards numbered 1 to 100. The probability of drawing a number which is a square is

1. $\frac{3}{10}$ 2. $\frac{1}{5}$ 3. $\frac{1}{10}$ 4. $\frac{3}{5}$

34. From a set of 17 cards numbered 1 to 17 one is drawn at random. The probability that it is divisible by 3 or 5 is

1. $\frac{4}{17}$ 2. $\frac{5}{17}$ 3. $\frac{6}{17}$ 4. $\frac{7}{17}$

35. An integer is chosen from the 1st 200 positive integers. The probability that the integer selected is divisible by 6 or 8 is

1. $\frac{2}{5}$ 2. $\frac{3}{8}$ 3. $\frac{1}{4}$ 4. $\frac{1}{2}$

36. The probability that a randomly chosen number from the set of first 100 natural numbers is divisible by 4 is

1. $\frac{5}{24}$ 2. $\frac{3}{4}$ 3. $\frac{1}{2}$ 4. $\frac{1}{4}$

37. The probability that a randomly chosen number from the 1st 100 natural numbers is divisible by 4 or 6 is

1. $\frac{11}{100}$ 2. $\frac{22}{100}$ 3. $\frac{33}{100}$ 4. $\frac{44}{100}$

38. From 25 tickets marked with the 1st 25 numerals, one is drawn at random, the probability that it is a multiple of 5 or 7 is

1. $\frac{7}{25}$ 2. $\frac{10}{25}$ 3. $\frac{8}{25}$ 4, $\frac{9}{25}$

39. From the set of numbers {1, 2, 3, 4, 5, 6, 7, 8} two numbers are selected at random without replace-

ment. The probability that their sum is more than 13 is

1. $\frac{1}{14}$ 2. $\frac{2}{7}$ 3. $\frac{3}{7}$ 4. $\frac{4}{7}$

40. From a box containing 10 cards numbered 1 to 10, four cards are drawn together. The probability that their sum is even is

1. $\frac{11}{21}$ 2. $\frac{5}{21}$ 3. $\frac{6}{21}$ 4. $\frac{1}{21}$

41. An urn contains 25 balls numbered 1 through 25. Two balls drawn one at a time with replacement. The probability that both the numbers on the balls are odd is

1. $\frac{{}^{13}c_2}{625}$ 2. $\frac{169}{625}$ 3. $\frac{{}^{25}c_2}{625}$ 4. $\frac{139}{625}$

42. There are 25 stamps numbered from 1 to 25 in a box. If a stamp is drawn at random from the box, the probability that the number on the stamp will be a prime number is

1. $\frac{7}{25}$ 2. $\frac{8}{25}$ 3. $\frac{9}{25}$ 4. $\frac{6}{25}$

43. If the probabilities of two dogs A and B dying within 10 years are respectively p and q, then the probability that at least one of them will be alive at the end of 10 years is

1. $p+q$ 2. $1-pq$ 3. $p+q-pq$ 4. pq

44. If the probabilities of two dogs A and B dying within 10 years are respectively p and q, then the probability that exactly one of them will be alive at the end of 10 years is

1. p+q-2pq 2. p+q
3. $1-pq$ 4. pq

45. The probability that the dog of Krishna will be alive 10 years hence is $\frac{7}{15}$ and that of Hari will be alive is $\frac{7}{10}$. The probability that both the dogs will be dead within 10 years is

1. $\frac{21}{150}$ 2. $\frac{24}{150}$ 3. $\frac{49}{150}$ 4. $\frac{5}{25}$

46. The probability that a man A will be alive for 20 more years is $\frac{3}{5}$ and the probability that his wife will be alive for 20 more years is $\frac{2}{3}$. The probability that only one will be alive at the end of 20 years is

1. $\frac{4}{15}$ 2. $\frac{2}{15}$ 3. $\frac{7}{15}$ 4. $\frac{8}{15}$

47. Suppose it is 9 to 7 against a person who is now 35 years of age living till he is 65 and 3:2 against a person B now 45, living till he is 75. The chance that at least one of the two persons will be alive 30 years hence is

1. $\frac{27}{80}$ 2. $\frac{53}{80}$ 3. $\frac{23}{80}$ 4. $\frac{51}{80}$

48. A husband and wife appear in an interview for two vacancies in the same post. The probability of husbands selection is $\frac{1}{7}$ and that of wife is $\frac{1}{5}$. The probability that both of them will be selected is

1. $\frac{24}{35}$ 2. $\frac{2}{7}$ 3. $\frac{1}{35}$ 4. $\frac{2}{35}$

49. A husband and wife appear in an interview for two vacancies in the same post. The probability of husbands selection is $\frac{1}{7}$ and that of wife is $\frac{1}{5}$. The probability that none of them will be selected is

1. $\frac{1}{35}$ 2. $\frac{2}{7}$ 3. $\frac{24}{35}$ 4. $\frac{2}{35}$

50. A husband and wife appear in an interview for two vacancies in the same post. The probability of husbands selection is $\frac{1}{7}$ and that of wife is $\frac{1}{5}$. The probability that only one of them will be selected is

1. $\frac{1}{35}$ 2. $\frac{24}{35}$ 3. $\frac{2}{7}$ 4. $\frac{2}{35}$

51. From each of the three married couples one partner is selected at random. The probability that all the three are males is

1. $\frac{1}{2}$ 2. $\frac{1}{4}$ 3. $\frac{1}{8}$ 4. $\frac{3}{8}$

52. From each of the three married couples one partner is selected at random. The probability that all the three are females is

1. $\frac{1}{2}$ 2. $\frac{1}{4}$ 3. $\frac{1}{8}$ 4. $\frac{3}{8}$

53. From each of the three married couples one partner is selected at random. The probability that all the three belong to the same sex is

1. $\frac{1}{2}$ 2. $\frac{1}{4}$ 3. $\frac{1}{8}$ 4. $\frac{3}{8}$

54. From each of the three married couples one partner is selected at random. The probability that 2 are males and one is a female is

1. $\frac{1}{8}$ 2. $\frac{1}{4}$ 3. $\frac{3}{8}$ 4. $\frac{1}{2}$

55. A and B are two candidates seeking admission in I.I.T. The probability that both A and B are selected is at the most 0.3. If the probability of A's selection is 0.5, then the probability of B's selection if A and B are independent is

1. 0.6 2. <0.6 3. ≤ 0.6 4. >0.6

56. In a room there are 6 couples. Out of them if 4 are selected at random, the probability that they may be couples is

1. $\frac{4}{33}$ 2. $\frac{2}{33}$ 3. $\frac{1}{33}$ 4. $\frac{3}{33}$

57. In a race three horses A, B and C are taking part. The probability of A's winning is twice the probability of B's winning and the probability of B's winning is thrice the probability of C's winning. The probability

of C's winning, if the dead heat is not possible is

1. $\frac{6}{10}$ 2. $\frac{3}{10}$ 3. $\frac{1}{10}$ 4. $\frac{2}{10}$

58. Three students A, B and C are to take part in a swimming competition. The probability of A's winning or B's winning each is 3 times the probability of C's winning. The probability of C's winning if there is no tie is

1. $\frac{4}{7}$ 2. $\frac{3}{7}$ 3. $\frac{2}{7}$ 4. $\frac{1}{7}$

59. Three squares of a chess board having 8×8 squares being chosen at random, the chance that all the three are white is

1. $\frac{^{32}c_3}{^{64}c_3}$ 2. $\frac{^{8}c_3}{^{64}c_3}$ 3. $\frac{^{16}c_3}{^{64}c_3}$ 4. $\frac{^{4}c_3}{^{64}c_3}$

60. Three squares of a chess board having 8×8 squares being chosen at random, the chance that all the three are black is

1. $\frac{^{32}c_3}{^{64}c_3}$ 2. $\frac{^{8}c_3}{^{64}c_3}$ 3. $\frac{^{16}c_3}{^{64}c_3}$ 4. $\frac{^{4}c_3}{^{64}c_3}$

61. Three squares of a chess board having 8×8 squares being chosen at random, the chance that all the three of the same colour is

1. $\frac{^{32}c_3}{^{64}c_3}$ 2. $\frac{2 \times {}^{32}c_3}{^{64}c_3}$ 3. 1 4. $\frac{^{4}c_3}{^{64}c_3}$

62. Three squares of a chess board having 8×8 squares being chosen at random, the chance that 2 are of one colour and 1 is of different colour is

1. $\frac{^{32}c_3}{^{64}c_3}$ 2. $\frac{^{16}c_3}{^{64}c_3}$ 3. $\frac{2 \times {}^{32}c_2 \times {}^{32}c_1}{^{64}c_3}$ 4. 1

63. A speaks truth in 75% of the cases and B in 80% of the cases. The percentage of cases they are likely to contradict each other in making the same statement is

1. 25% 2. 35% 3. 50% 4. 65%

64. A speaks truth in 75% of the cases and B in 80% of the cases. The percentage of cases they are likely to concur with each other in making the same statement is

1. 25% 2. 35% 3. 50% 4. 65%

65. A bag contains 17 counters marked with numbers 1 to 17 on chits. A counter is drawn and replaced. A second draw is then made. The chance that the number on the counter drawn 1st is even and the second is odd is

1. $\frac{64}{289}$ 2. $\frac{81}{289}$ 3. $\frac{72}{289}$ 4. $\frac{36}{289}$

66. The probability that a leap year will have 53 Sundays is

1. $\frac{1}{7}$ 2. $\frac{2}{7}$ 3. $\frac{3}{7}$ 4. $\frac{4}{7}$

67. The probability that a leap year will have only 52 Sundays is

1. $\frac{4}{7}$ 2. $\frac{5}{7}$ 3. $\frac{6}{7}$ 4. $\frac{1}{7}$

68. The probability that a leap year will have 53 Sundays or 53 Mondays is

1. $\frac{1}{7}$ 2. $\frac{2}{7}$ 3. $\frac{3}{7}$ 4. $\frac{4}{7}$

69. The probability that a leap year will have 53 Tuesdays or 53 Fridays is

1. $\frac{2}{7}$ 2. $\frac{3}{7}$ 3. $\frac{4}{7}$ 4. $\frac{1}{7}$

70. The probability that a leap year will have 53 Sundays and 53 Mondays is

1. $\frac{3}{7}$ 2. $\frac{2}{7}$ 3. $\frac{1}{7}$ 4. $\frac{4}{7}$

71. The probability that a non-leap year will have 53 Fridays is

1. $\frac{3}{7}$ 2. $\frac{2}{7}$ 3. $\frac{1}{7}$ 4. $\frac{4}{7}$

72. The probability that a non-leap year will have only 52 Fridays is

1. $\frac{3}{7}$ 2. $\frac{4}{7}$ 3. $\frac{5}{7}$ 4. $\frac{6}{7}$

73. The probability that the February of a leap year will have 5 saturdays is

1. $\frac{3}{7}$ 2. $\frac{2}{7}$ 3. $\frac{1}{7}$ 4. $\frac{4}{7}$

74. The probability that in a month of March there will be 5 Wednesdays is

1. $\frac{1}{4}$ 2. $\frac{2}{7}$ 3. $\frac{3}{7}$ 4. $\frac{4}{7}$

75. The probability that in a month of April there will be 5 Tuesdays is

1. $\frac{3}{7}$ 2. $\frac{2}{7}$ 3. $\frac{1}{7}$ 4. $\frac{4}{7}$

76. The probability that 13th day of the randomly chosen month is a Friday is

1. $\frac{1}{7}$ 2. $\frac{1}{12}$ 3. $\frac{1}{84}$ 4. $\frac{1}{42}$

77. If A and B are two events such that $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ and $P(A \cup B)=\frac{3}{4}$, then $P(A \cap \overline{B})=$

1. $\frac{5}{8}$ 2. $\frac{3}{8}$ 3. $\frac{1}{8}$ 4. $\frac{2}{8}$

78. Three electric lamps are to be fit in a room. Three bulbs are chosen at random from 10 bulbs having 6 good bulbs and fitted. The chance that the room is lighted is

1. $\frac{1}{30}$ 2. $\frac{2}{30}$ 3. $\frac{28}{30}$ 4. $\frac{29}{30}$

79. The odds against A solving a certain problem are 4 to 3 and the odds in favour of B solving the same

problem are 7 to 5. If both of them try independently, the probability that the problem will be solved is

1. $\frac{11}{21}$ 2. $\frac{13}{21}$ 3. $\frac{16}{21}$ 4. $\frac{8}{21}$

80. The odds against a certain event are 5 to 2 and the odds in favour of an other event independent of the former are 6 to 5. The probability that none of the events will happen is

1. $\frac{52}{77}$ 2. $\frac{12}{77}$ 3. $\frac{25}{77}$ 4. $\frac{5}{77}$

81. A person is known to hit the target in 3 out of 4 shots, where as an other person is known to hit twice in every three attempts. If both of them try independently the probability that the target being hit is

1. $\frac{1}{12}$ 2. $\frac{11}{12}$ 3. $\frac{5}{12}$ 4. $\frac{3}{12}$

82. A, B and C can solve a problem independently with respective probabilities $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$. If all of them try independently the probability that the problem will be solved is

1. $\frac{1}{60}$ 2. $\frac{3}{5}$ 3. $\frac{48}{60}$ 4. $\frac{57}{60}$

83. The probability that A can solve a problem in Mathematics is $\frac{2}{5}$ and B can solve it is $\frac{3}{8}$ and for C it is $\frac{4}{10}$. When all of them try independently, the probability that the problem will not be solved is

1. $\frac{31}{40}$ 2. $\frac{9}{40}$ 3. $\frac{11}{40}$ 4. $\frac{3}{40}$

84. A can hit a target 3 times in 6 shots; B, 2 times in 4 shots and C, 4 times in 4 shots. All of them fire at a target independently. The probability that the target will be hit is

1. 1 2. 0.5 3. 0.25 4. 0.125

85. Two cards are selected at random from 10 cards numbered 1 to 10. The probaility that their sum is odd, if the 2 cards are drawn one after an other without replacement is

1. $\frac{5}{9}$ 2. $\frac{4}{9}$ 3. $\frac{2}{9}$ 4. $\frac{3}{9}$

86. The results of an examination in two papers A and B for 20 candidates were recorded as follows. 8 passed in paper A, 7 passed in paper B, 8 failed in both the papers A and B. If one is selected at random, the probability that the candidate has failed in A or B is

1. $\frac{15}{20}$ 2. $\frac{16}{20}$ 3. $\frac{17}{20}$ 4. $\frac{18}{20}$

87. The results of an examination in two papers A and B for 20 candidates were recorded as follows. 8 passed in paper A, 7 passed in paper B, 8 failed in both the papers A and B. If one is selected at random, the probability that the candidate has passed in both the papers A and B is

1. $\frac{4}{20}$ 2. $\frac{3}{20}$ 3. $\frac{17}{20}$ 4. $\frac{15}{20}$

88. The probability that a student passes in Mathematics is $\frac{2}{3}$ and the probability that he passes in English is $\frac{4}{9}$. The probability that he passes in any one of the courses is $\frac{4}{5}$. The probability that he passes in both is

1. $\frac{11}{45}$ 2. $\frac{14}{45}$ 3. $\frac{17}{45}$ 4. $\frac{15}{45}$

89. In a group of 25 people everybody is proficient either in Mathematics or in Statistics or in both. Out of them 19 people are proficient in Mathematics and 16 are proficient in Statistics. If a person is selected at random, the probability that he is proficient both in Mathematics & Statistics is

1. $\frac{1}{5}$ 2. $\frac{2}{5}$ 3. $\frac{3}{5}$ 4. $\frac{4}{5}$

90. Two cards are drawn at random from 10 cards numbered 1 to 10. The probability that their sum is odd, if the two cards are drawn together is

1. $\frac{2}{9}$ 2. $\frac{4}{9}$ 3. $\frac{5}{9}$ 4. $\frac{3}{9}$

91. The probability that A will fail in an examination is 0.2 and that of B failing is 0.3. The probability that exactly one of them will fail is

1. 0.38 2. 0.35 3. 0.42 4. 0.62

92. There are three events A, B and C one of which and only one can happen. The odds are 7 to 3 against A and 6 to 4 against B. The odds against C are

1. 3 to 4 2. 4 to 3 3. 7 to 3 4. 3 to 7

93. The probability that A and B pass in an examination is $\frac{2}{10}$ and $\frac{3}{10}$ respectively. The probability that only one of them will pass the examination is

1. $\frac{35}{100}$ 2. $\frac{38}{100}$ 3. $\frac{41}{100}$ 4. $\frac{45}{100}$

94. A single letter is selected at random from the word ARTICLE, the probability that it is a vowel is

1. $\frac{2}{7}$ 2. $\frac{3}{7}$ 3. $\frac{4}{7}$ 4. $\frac{5}{7}$

95. The probability that at least one of the events A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then $P(\overline{A})+P(\overline{B})=$

1. 0.4 2. 0.8 3. 1.2 4. 1.6

96. In a book of 100 pages, if a page is opened at random, the probability that the number on it is a prime is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{8}$

97. A letter is taken out at random from the English alphabet. The probability that it is a vowel is

1. $\frac{3}{26}$ 2. $\frac{4}{26}$ 3. $\frac{5}{26}$ 4. $\frac{2}{26}$

98. A single letter is selected at random from the word PROBABILITY. The probability that it is a vowel is

1. $\frac{3}{11}$ 2. $\frac{4}{11}$ 3. $\frac{2}{11}$ 4. $\frac{5}{11}$

99. A single letter is selected at random from the word PROBABILITY. The probability that it is not a vowel is

1. $\frac{4}{11}$ 2. $\frac{2}{11}$ 3. $\frac{7}{11}$ 4. $\frac{5}{11}$

100. Two letters are taken at random from the word HOME. The probability that at least one is a vowel is

1. $\frac{1}{2}$ 2. $\frac{2}{3}$ 3. $\frac{5}{6}$ 4. $\frac{1}{4}$

101. There are 100 pages in a book. If a page of the book is opened at random, the probability that the number on the page is two digit number made up with the same digit is

1. $\frac{8}{100}$ 2. $\frac{9}{100}$ 3. $\frac{1}{10}$ 4. $\frac{8}{10}$

102. In a book of 100 pages, if a page is opened at random, the probability that the number on it is a cube is

1. $\frac{1}{8}$ 2. $\frac{1}{9}$ 3. $\frac{1}{25}$ 4. $\frac{1}{4}$

103. The probability of getting a number between 1 and 100, which is divisible by one and itself only is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{25}{98}$ 4. $\frac{15}{98}$

104. Counters numbered 1, 2, 3 are placed in a bag and one is drawn at random and replaced. The operation is being repeated three times. The probability of obtaining a total of 6 is

1. $\frac{7}{9}$ 2. $\frac{6}{27}$ 3. $\frac{7}{27}$ 4. $\frac{5}{27}$

105. If A and B are two mutually exclusive events, then the relation between $P(\overline{A})$ and $P(B)$ is

1. $P(B) \geq P(\overline{A})$ 2. $P(B) \leq P(\overline{A})$

3. $P(B) = P(A)$ 4. $P(B) < P(A)$

106. If A and B are two mutually exclusive events, then the relation between $P(A)$ and $P(\overline{B})$ is

1. $P(A) \geq P(\overline{B})$ 2. $P(A) \leq P(\overline{B})$

3. $P(A) = P(\overline{B})$ 4. $P(A) < P(B)$

107. A and B are two events such that P(A)=0.5, $P(A \cup \overline{B}) = 0.7$. If A and B are independent events P(B) =

1. 1.5 2. 2.5 3. $\frac{3}{5}$ 4. $\frac{4}{5}$

108. Let A and B be two events such that P(A)=0.3 and $P(A \cup \overline{B}) = 0.8$. If A and B are independent events P(B) =

1. $\frac{1}{7}$ 2. $\frac{2}{7}$ 3. $\frac{3}{7}$ 4. $\frac{4}{7}$

109. If A and B are two mutually exclusive events such that P(A) = 0.55 and P(B) = 0.35 then $P(\overline{A} \cup \overline{B}) =$

1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. 1 4. $\frac{1}{8}$

110. There are 10 cards in a bag. On 5 of them "N" is printed and on the other 5 "C" is printed. 3 cards are drawn, one after an other without replacement and kept in that order. The probability that the word formed with the letters is NCC is

1. $\frac{5}{36}$ 2. $\frac{7}{36}$ 3. $\frac{11}{36}$ 4. $\frac{3}{36}$

111. For an oral test 25 questions are set of which 5 are easy and 20 are tough. Two questions are given to two candidates A and B in that order (one question to each person). The probability for B to receive easy question is

1. $\frac{1}{5}$ 2. $\frac{4}{5}$ 3. $\frac{5}{24}$ 4. $\frac{19}{24}$

112. The probability of getting a head, when an unbiased coin is tossed is

1. 0 2. $\frac{1}{2}$ 3. 1 4. 2

113. The probability of getting tail, when an unbiased coin is tossed is

1. 0 2. $\frac{1}{2}$ 3. 1 4. 2

114. The probability of getting head or tail, when an unbiased coin is tossed is

1. 0 2. $\frac{1}{2}$ 3. 1 4. 2

115. The probability of obtaining exactly r heads and $(n-r)$ tails, when we toss n unbiased coins is

1. $\frac{r}{n}$ 2. $\frac{(n-r)}{n}$ 3. $\frac{{}^nc_r}{2^n}$ 4. $\frac{{}^nc_r}{3^n}$

116. The probability of obtaining at least one head when we toss n unbiased coins is

1. $\frac{{}^nc_0}{2^n}$ 2. $\frac{1-{}^nc_r}{2^n}$ 3. $1-\frac{1}{2^n}$ 4. $\frac{{}^nc_r}{2^n}$

117. The probability of obtaining 4 heads, 4 tails when 8 unbiased coins are tossed is

1. $\frac{1}{2}$ 2. $\frac{{}^8c_4}{2^8}$ 3. $\frac{{}^8c_0}{2^8}$ 4. $\frac{1}{4}$

118. The probability of getting a head and 6 tails when an unbiased coin is tossed 7 times is

1. $\frac{1}{128}$ 2. $\frac{5}{128}$ 3. $\frac{7}{128}$ 4. $\frac{3}{128}$

119. If two coins are tossed 5 times, the chance that there will be 5 heads and 5 tails is

1. $\frac{45}{256}$ 2. $\frac{120}{256}$ 3. $\frac{63}{256}$ 4. $\frac{30}{256}$

120. The probability of getting at least one head when we toss 3 unbiased coins is

1. $\frac{3}{8}$ 2. $\frac{5}{8}$ 3. $\frac{7}{8}$ 4. $\frac{1}{8}$

121. The probability of getting at least one head when we toss 5 unbiased coins is

1. $\frac{5}{32}$ 2. $\frac{1}{32}$ 3. $\frac{31}{32}$ 4. $\frac{4}{32}$

122. A coin is weighted so that head is twice as likely to appear as tail. When such a coin is tossed once the probability of getting tail is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{1}{4}$

123. If a coin is so biased that head is thrice as likely to appear as tail, then the probability of head is

1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. $\frac{3}{4}$ 4. $\frac{1}{8}$

124. Two persons A and B have respectively (n+1) and n coins which they toss simultaneously. The probability that A will have more number of heads is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{8}$

125. A tosses 2 coins while B tosses 3. The probability that B obtains more number of heads is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{3}{4}$

126. The probability of getting at least 2 heads, when an unbiased coin is tossed 6 times is

1. $\frac{63}{64}$ 2. $\frac{57}{64}$ 3. $\frac{7}{64}$ 4. $\frac{37}{64}$

127. When a fair coin is tossed thrice, the probability of obtaining head at most twice is

1. $\frac{1}{8}$ 2. $\frac{5}{8}$ 3. $\frac{7}{8}$ 4. $\frac{3}{8}$

128. A fair coin is tossed 4 times. The probability that heads exceed tails in number is

1. $\frac{3}{16}$ 2. $\frac{1}{4}$ 3. $\frac{5}{16}$ 4. $\frac{7}{16}$

129. A and B toss a coin alternately till one of them gets a head and wins the game. The probability of A's winning if A starts the game is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{1}{4}$

130. If a coin is tossed 3 times the probability of getting one head or one tail is

1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. $\frac{2}{3}$ 4. $\frac{3}{4}$

131. If a coin is tossed 3 times the probability of obtaining 2 heads or 2 tails is

1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. $\frac{2}{3}$ 4. $\frac{3}{4}$

132. When a perfect die is rolled, the probability of getting a face with 4 points upward is

1. $\frac{4}{6}$ 2. $\frac{3}{6}$ 3. $\frac{2}{6}$ 4. $\frac{1}{6}$

133. When a perfect die is rolled, the probability of getting a face with 4 or 5 points upward is

1. $\frac{1}{3}$ 2. $\frac{2}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{4}$

134. When a perfect die is rolled, the probability of getting a face with even number of points upward is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{8}$

135. When a perfect die is rolled the probability of getting a face with odd number of points upward is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{8}$

136. When a perfect die is rolled the probability of getting any one of the 6 faces upward is

1. $\frac{1}{6}$ 2. $\frac{1}{2}$ 3. 1 4. 2

137. In a single throw of a symmetrical die the probability that a number less than 4 is obtained, given that the throw resulted is an odd number is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{1}{4}$

138. A symmetrical die is rolled. If an odd number comes up on it, then the probability of getting a prime number greater than 3 on it is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{1}{4}$

139. A perfect die is rolled. If the outcome is an odd number, the probability that it is a prime is

1. $\frac{1}{3}$ 2. $\frac{2}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{8}$

140. Three faces of a fair die are yellow, two faces red and one blue. The die is tossed 3 times. The probability that the colours yellow, red and blue appear in the 1st, 2nd and 3rd tosses respectively is

1. $\frac{1}{6}$ 2. $\frac{1}{36}$ 3. $\frac{35}{36}$ 4. $\frac{1}{3}$

141. Three faces of a fair die are yellow, two faces red and one blue. The die is tossed 3 times. The probability that all the three times we get yellow colour is

1. $\frac{3}{8}$ 2. $\frac{5}{8}$ 3. $\frac{1}{8}$ 4. $\frac{7}{8}$

142. Three faces of a fair die are yellow, two faces red

and one blue. The die is tossed 3 times. The probability that it will show yellow colour in the 1st 2 throws and red in the 3rd throw is

1. $\frac{1}{36}$ 2. $\frac{1}{18}$ 3. $\frac{1}{12}$ 4. $\frac{1}{6}$

143. Three faces of a fair die are yellow, two faces red and one blue. The die is tossed 3 times. The probability that it will show red colour in the 1st two throws and blue in the 3rd throw is

1. $\frac{1}{18}$ 2. $\frac{1}{36}$ 3. $\frac{1}{54}$ 4. $\frac{1}{27}$

144. The probability of getting a number greater than 2 or an even number in a single throw of a fair die is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{5}{6}$ 4. $\frac{1}{4}$

145. Two persons A and B alternately throw a die and the person who 1st throws 5 wins. If A starts the game the probability of his winning is

1. $\frac{1}{6}$ 2. $\frac{5}{11}$ 3. $\frac{6}{11}$ 4. $\frac{3}{11}$

146. Two persons A and B alternately throw a die. The person who 1st throw 4 or 5 wins. If A starts the game, the probability of his winning is

1. $\frac{1}{5}$ 2. $\frac{2}{5}$ 3. $\frac{3}{5}$ 4. $\frac{4}{5}$

147. Two symmetrical dice are thrown. The probability of getting a sum of 6 points is

1. $\frac{4}{36}$ 2. $\frac{5}{36}$ 3. $\frac{6}{36}$ 4. $\frac{1}{36}$

148. Two symmetrical dice are thrown. The probability of getting a sum of 7 points is

1. $\frac{4}{36}$ 2. $\frac{5}{36}$ 3. $\frac{6}{36}$ 4. $\frac{1}{36}$

149. Two symmetrical dice are thrown. The probability of getting a sum of 8 points is

1. $\frac{4}{36}$ 2. $\frac{5}{36}$ 3. $\frac{6}{36}$ 4. $\frac{1}{36}$

150. Two uniform dice marked 1 to 6 are thrown together. The probability that the total score on them is either minimum or maximum.

1. $\frac{4}{36}$ 2. $\frac{5}{36}$ 3. $\frac{2}{36}$ 4. $\frac{1}{36}$

151. Two uniform dice marked 1 to 6 are thrown together. The probability that the score on the two dice is at least seven is

1. $\frac{5}{12}$ 2. $\frac{7}{12}$ 3. $\frac{3}{4}$ 4. $\frac{1}{2}$

152. Two uniform dice marked 1 to 6 are thrown together. The probability that the score on the two dice is at the most 7 is

1. $\frac{5}{12}$ 2. $\frac{7}{12}$ 3. $\frac{3}{4}$ 4. $\frac{1}{2}$

153. Two uniform dice marked 1 to 6 are thrown together. The probability that the score on the two dice is either 7 or 11 is

1. $\frac{5}{9}$ 2. $\frac{2}{9}$ 3. $\frac{11}{36}$ 4. $\frac{5}{36}$

154. Two uniform dice marked 1 to 6 are thrown together. The probability that the sum is neither 7 nor 11 is

1. $\frac{2}{9}$ 2. $\frac{5}{9}$ 3. $\frac{7}{9}$ 4. $\frac{4}{9}$

155. Two uniform dice marked 1 to 6 are thrown together. The probability that the sum is a prime number is

1. $\frac{1}{12}$ 2. $\frac{1}{4}$ 3. $\frac{5}{12}$ 4. $\frac{4}{12}$

156. Two uniform dice marked 1 to 6 are thrown together. The probability that the sum is not a prime number is

1. $\frac{1}{4}$ 2. $\frac{5}{12}$ 3. $\frac{7}{12}$ 4. $\frac{9}{12}$

157. Two uniform dice marked 1 to 6 are thrown together. The probability that the sum is even is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{12}$

158. Two uniform dice marked 1 to 6 are thrown together. The probability that the sum is odd is

1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{12}$

159. In a throw with a pair of symmetrical dice the probability of obtaining a doublet is

1. $\frac{1}{6}$ 2. $\frac{2}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{2}$

160. When two symmetrical dice are rolled simultaneously, the probability that both the dice show even numbers is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{8}$

161. When two symmetrical dice are rolled simultaneously, the probability that both the dice show odd numbers is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{8}$

162. A fair die is tossed twice. The probability of getting a 4, 5 or 6 on the 1st toss and a 1, 2, 3 or 4 on the 2nd toss is

1. $\frac{1}{2}$ 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{8}$

163. Two dice are thrown. The probability that the absolute difference of points on them is 4 is

1. $\frac{1}{7}$ 2. $\frac{1}{8}$ 3. $\frac{1}{9}$ 4. $\frac{1}{6}$

164. The probability of getting at least an ace when two dice are rolled is

1. $\frac{11}{36}$ 2. $\frac{25}{36}$ 3. $\frac{1}{6}$ 4. $\frac{1}{8}$

165. If two symmetrical dice are thrown, the probability that at least one of the dice shows a number greater than 3 is

1. $\frac{1}{2}$ 2. $\frac{1}{4}$ 3. $\frac{3}{4}$ 4. $\frac{1}{8}$

166. Two dice are thrown. The probability of scoring a sum greater than 9 or a doublet is

1. $\frac{1}{6}$ 2. $\frac{1}{18}$ 3. $\frac{5}{18}$ 4. $\frac{2}{18}$

167. The chance of throwing an ace in the 1st only, of the two successive throws with an ordinary die is

1. $\frac{1}{6}$ 2. $\frac{1}{36}$ 3. $\frac{5}{36}$ 4. $\frac{5}{6}$

168. A symmetrical die is thrown 2 times. The probability of getting a multiple of 2 on 1st throw and a multiple of 3 on the 2nd throw is

1. $\frac{1}{3}$ 2. $\frac{1}{6}$ 3. $\frac{11}{36}$ 4. $\frac{1}{36}$

169. A and B alternately throw with a pair of dice. Who ever gets a sum of 7 points 1st will win the game. If A starts the game, the probability of his winning is

1. $\frac{4}{11}$ 2. $\frac{5}{11}$ 3. $\frac{6}{11}$ 4. $\frac{3}{11}$

170. A and B alternately throw a pair of symmetrical dice. Who ever throws a sum of 9 points first will be declared as winner. If A starts the game, the probability of his winning is

1. $\frac{7}{17}$ 2. $\frac{8}{17}$ 3. $\frac{9}{17}$ 4. $\frac{6}{17}$

171. A and B alternately throw a pair of symmetrical dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, the probability of his winning is

1. $\frac{11}{36}$ 2. $\frac{30}{61}$ 3. $\frac{31}{61}$ 4. $\frac{1}{36}$

172. A pair of dice is rolled together till a sum of either 5 or 7 is obtained. Then the probability that 5 comes before 7 is

1. $\frac{1}{5}$ 2. $\frac{2}{5}$ 3. $\frac{3}{5}$ 4. $\frac{4}{5}$

173. A pair of dice is rolled till a sum of either 8 or 9 is obtained. Then the probability that 8 comes before 9 is

1. $\frac{4}{9}$ 2. $\frac{5}{9}$ 3. $\frac{7}{9}$ 4. $\frac{6}{9}$

174. A man alternately tosses a coin and throws a die beginning with coin. The probability that he gets a head before he gets 5 or 6 on the die is

1. $\frac{1}{4}$ 2. $\frac{1}{2}$ 3. $\frac{3}{4}$ 4. $\frac{1}{8}$

175. Two symmetrical dice are thrown. The probability that the product of the numbers on their upper most faces is 12 is

1. $\frac{1}{7}$ 2. $\frac{1}{8}$ 3. $\frac{1}{9}$ 4. $\frac{1}{6}$

176. Three symmetrical dice are thrown. The probability that the same number will appear on each of them is

1. $\frac{1}{216}$ 2. $\frac{1}{36}$ 3. $\frac{35}{36}$ 4. $\frac{1}{35}$

177. Three symmetrical dice are thrown. The probability of having different points on them is

1. $\frac{35}{36}$ 2. $\frac{4}{9}$ 3. $\frac{5}{9}$ 4. $\frac{1}{36}$

178. Six symmetrical dice are thrown simultaneously. The probability of having different points on them is

1. $\frac{1}{6}$ 2. $\frac{1}{36}$ 3. $\frac{{}^6p_6}{6^6}$ 4. $\frac{1}{18}$

179. Three symmetrical dice are thrown. The probability of obtaining a sum of 3 points is

1. $\frac{1}{72}$ 2. $\frac{1}{54}$ 3. $\frac{1}{216}$ 4. $\frac{1}{27}$

180. Three symmetrical dice are thrown. The probability of obtaining a sum of 4 points is

1. $\frac{1}{72}$ 2. $\frac{1}{54}$ 3. $\frac{1}{216}$ 4. $\frac{1}{36}$

181. Three symmetrical dice are thrown. The probability of obtaining a sum of 5 points is

1. $\frac{1}{6}$ 2. $\frac{1}{36}$ 3. $\frac{1}{216}$ 4. $\frac{1}{54}$

182. Three symmetrical dice are thrown. The probability of obtaining a sum of 6 points is

1. $\frac{5}{54}$ 2. $\frac{5}{108}$ 3. $\frac{5}{216}$ 4. $\frac{1}{54}$

183. Three symmetrical dice are thrown. The probability of obtaining a sum of 18 points is

1. $\frac{1}{72}$ 2. $\frac{1}{54}$ 3. $\frac{1}{216}$ 4. $\frac{5}{216}$

184. Three symmetrical dice are thrown. The probability of obtaining a sum of 17 points is

1. $\frac{1}{72}$ 2. $\frac{1}{54}$ 3. $\frac{1}{216}$ 4. $\frac{5}{216}$

185. Three symmetrical dice are thrown. The probability of obtaining a sum of 16 points is

1. $\frac{1}{6}$ 2. $\frac{1}{36}$ 3. $\frac{1}{216}$ 4. $\frac{1}{72}$

186. Three symmetrical dice are thrown. The probability of obtaining a sum of 15 points is

1. $\frac{5}{54}$ 2. $\frac{5}{108}$ 3. $\frac{5}{216}$ 4. $\frac{1}{216}$

187. A and B throw with 3 dice. If A throws a sum of 16 points, the probability of B throwing a higher sum is

1. $\frac{7}{54}$ 2. $\frac{5}{54}$ 3. $\frac{1}{54}$ 4. $\frac{3}{54}$

188. On a symmetrical die the numbers 1, -1, 2, -2, 3 and 0 are marked on its 6 faces. If such a die is thrown 3 times, the probability that the sum of points on them is 6 is

1. $\frac{5}{27}$ 2. $\frac{5}{54}$ 3. $\frac{5}{108}$ 4. $\frac{3}{108}$

189. A symmetrical die is thrown 4 times. The probability that 3 and 6 will turn up exactly 2 times each is

1. $\frac{1}{6^4}$ 2. $\frac{1}{6^3}$ 3. $\frac{1}{6^2}$ 4. $\frac{1}{6}$

190. A cubical die is thrown 6 times. The probability that 2 and 4 will turn up exactly 3 times each is

1. $\frac{1}{6^6}$ 2. $\frac{\angle 6}{6^6}$ 3. $\frac{\angle 6}{\angle 3 \angle 3} \times \frac{1}{6^6}$ 4. 1

191. Two dice are thrown and the sum of points on them is found to be 6. The probability of getting a face with 2 points on any of the dice is

1. $\frac{4}{5}$ 2. $\frac{3}{5}$ 3. $\frac{2}{5}$ 4. $\frac{1}{5}$

192. When two dice are rolled, the probability that the sum of points on them is even or less than 5 points is

1. $\frac{7}{9}$ 2. $\frac{5}{9}$ 3. $\frac{4}{9}$ 4. $\frac{3}{9}$

193. Two dice are thrown twice. The probability that the 1st throw will give a sum of 7 points and second throw a sum of 11 points is

1. $\frac{7}{108}$ 2. $\frac{5}{108}$ 3. $\frac{1}{108}$ 4. $\frac{3}{108}$

194. Two symmetrical dice are thrown at a time. If the sum of points on them is 7, the chance that one of them will show a face with 2 points is

1. $\frac{1}{8}$ 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{2}{8}$

195. A and B are to throw with a pair of symmetrical dice. If B throws a sum of 5 points then A's chance of throwing a sum less than 5 is

1. $\frac{1}{4}$ 2. $\frac{1}{5}$ 3. $\frac{1}{6}$ 4. $\frac{1}{8}$

196. Two dice are thrown. The probability of getting a sum of less than 7 points or a double is

1. $\frac{1}{6}$ 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{1}{2}$

197. Three symmetrical dice are thrown. The probability of obtaining a sum of 7 points is

1. $\frac{25}{216}$ 2. $\frac{7}{72}$ 3. $\frac{5}{72}$ 4. $\frac{1}{8}$

198. Three symmetrical dice are thrown. The probability of obtaining a sum of 8 points is

1. $\frac{25}{216}$ 2. $\frac{7}{72}$ 3. $\frac{5}{72}$ 4. $\frac{1}{8}$

199. Three symmetrical dice are thrown. The probability of obtaining a sum of 9 points is

1. $\frac{25}{216}$ 2. $\frac{7}{72}$ 3. $\frac{5}{72}$ 4. $\frac{1}{8}$

200. Three symmetrical dice are thrown. The probability of obtaining a sum of 10 points is

1. $\frac{25}{216}$ 2. $\frac{1}{8}$ 3. $\frac{7}{72}$ 4. $\frac{5}{72}$

201. Three symmetrical dice are thrown. The probability of obtaining a sum of 11 points is

1. $\frac{25}{216}$ 2. $\frac{1}{8}$ 3. $\frac{7}{72}$ 4. $\frac{5}{72}$

202. Three symmetrical dice are thrown. The probability of obtaining a sum of 12 points is

1. $\frac{25}{216}$ 2. $\frac{1}{8}$ 3. $\frac{7}{72}$ 4. $\frac{5}{72}$

203. Three symmetrical dice are thrown. The probability of obtaining a sum of 13 points is

1. $\frac{1}{8}$ 2. $\frac{5}{72}$ 3. $\frac{7}{72}$ 4. $\frac{25}{216}$

204. Three symmetrical dice are thrown. The probability of obtaining a sum of 14 points is

1. $\frac{1}{8}$ 2. $\frac{5}{72}$ 3. $\frac{7}{72}$ 4. $\frac{25}{216}$

205. The probability of getting a number less than 5 or an odd number in a single throw of a symmetrical die is

1. $\frac{3}{6}$ 2. $\frac{4}{6}$ 3. $\frac{5}{6}$ 4. $\frac{1}{6}$

206. Two symmetrical dice are thrown. The probability of throwing a double such that their sum is greater than 9 is

1. $\frac{1}{36}$ 2. $\frac{1}{18}$ 3. $\frac{1}{9}$ 4. $\frac{1}{72}$

207. Two symmetrical dice are thrown. The probability of throwing a double such that their sum is less than 9 is

1. $\frac{1}{36}$ 2. $\frac{1}{18}$ 3. $\frac{1}{9}$ 4. $\frac{1}{72}$

208. Two symmetrical dice are thrown at a time. The probability that they show different faces is

1. $\frac{5}{6}$ 2. $\frac{1}{36}$ 3. $\frac{25}{36}$ 4. $\frac{1}{18}$

209. Two symmetrical dice are rolled. The probability that sum of the points on them is divisible by 5 is

1. $\frac{2}{9}$ 2. $\frac{4}{9}$ 3. $\frac{7}{36}$ 4. $\frac{5}{9}$

210. An ordinary die has 4 blank faces, one face marked 2 and an other marker 3. Then the probability of obtaining a total of exactly 5 in 2 throws is

1. $\frac{1}{36}$ 2. $\frac{1}{18}$ 3. $\frac{1}{9}$ 4. $\frac{1}{72}$

211. An ordinary die has 4 blank faces, one face marked 2 and an other marked 3. Then the probability of obtaining a total of exactly 6 in 2 throws is

1. $\frac{1}{36}$ 2. $\frac{1}{18}$ 3. $\frac{1}{9}$ 4. $\frac{1}{72}$

212. An ordinary die has 4 blank faces, one face marked 2 and another marked 3. Then the probability of obtaining a total of 0 points in 5 throws is

1. $\left(\frac{1}{6}\right)^5$ 2. $\left(\frac{1}{2}\right)^5$ 3. $\left(\frac{2}{3}\right)^5$ 4. $\left(\frac{1}{4}\right)^5$

213. Two cards are drawn at random from a pack of 52

well shuffled playing cards. The probability that the cards drawn are aces is

1. $\frac{5}{221}$ 2. $\frac{3}{221}$ 3. $\frac{1}{221}$ 4. $\frac{4}{221}$

214. When a card is drawn at random from a well shuffled pack of 52 playing cards, the probability that it may be either king or queen is

1. $\frac{8}{13}$ 2. $\frac{5}{13}$ 3. $\frac{2}{13}$ 4. $\frac{1}{13}$

215. A card is drawn at random from a well shuffled pack of 52 playing cards. The probability that the card is either a face card or a six is

1. $\frac{4}{13}$ 2. $\frac{3}{13}$ 3. $\frac{2}{13}$ 4. $\frac{6}{13}$

216. From a well shuffled pack of 52 playing cards two cards are drawn at random, one after an other without replacement. The probability that 1st one is a king and second one is queen is

1. $\frac{5}{663}$ 2. $\frac{4}{663}$ 3. $\frac{1}{221}$ 4. $\frac{3}{221}$

217. The chance of drawing a king, a queen and a knave in that order from a pack of cards in three consecutive draws, when the cards are not being replaced is

1. $\frac{4}{52}\times\frac{4}{51}\times\frac{4}{50}$ 4. $\frac{4}{52}\times\frac{3}{51}\times\frac{2}{50}$

3. $\frac{4}{52}\times\frac{4}{52}\times\frac{4}{52}$ 4. $\frac{4}{52}\times\frac{3}{52}\times\frac{2}{52}$

218. From a well shuffled pack of 52 playing cards 4 cards are drawn, one at a time without replacement at random. The probability that they are aces is

1. $\frac{4}{13^3}$ 2. $\frac{24}{13^3}$

3. $\frac{4}{52}\times\frac{3}{51}\times\frac{2}{50}\times\frac{1}{49}$ 4. $\frac{12}{13^3}$

219. A card is drawn from a well shuffled pack of 52 playing cards. It is replaced in the pack after noting its colour. Again a card is drawn at random. The probability that the 1st card drawn may be a heart and the second card drawn may not be a queen is

1. $\frac{5}{13}$ 2. $\frac{4}{13}$ 3. $\frac{3}{13}$ 4. $\frac{2}{13}$

220. A card is drawn from a well shuffled pack of 52 playing cards. It is replaced in the pack after noting its colour. Again a card is drawn at random. The probability that both the cards drawn may be hearts is

1. $\frac{1}{14}$ 2. $\frac{1}{15}$ 3. $\frac{1}{16}$ 4. $\frac{1}{12}$

221. A card is drawn from a well shuffled pack of 52 playing cards. It is replaced in the pack after noting its colour. Again a card is drawn at random. The probability that both cards drawn are red is

1. $\frac{1}{16}$ 2. $\frac{1}{8}$ 3. $\frac{1}{4}$ 4. $\frac{1}{2}$

222. A pack of cards is distributed among four hands equally. The probability that 5 spades, 3 clubs, 3 hearts and the rest diamonds may be in a particular hand is

1. $\frac{{}^{4}c_1\times{}^{13}c_5\times{}^{13}c_3\times{}^{13}c_2}{{}^{52}c_{13}}$ 2. $\frac{{}^{13}c_5\times{}^{26}c_6\times{}^{13}c_2}{{}^{52}c_{13}}$

3. $\frac{{}^{13}c_5\times{}^{13}c_3\times{}^{13}c_3\times{}^{13}c_2}{{}^{52}c_{13}}$ 4. $\frac{{}^{4}c_1\times{}^{13}c_3\times{}^{13}c_3\times{}^{13}c_2}{{}^{52}c_{13}}$

223. If two cards are drawn from a well shuffled pack of 52 playing cards, the probability that there will be at least one club card is

1. $\frac{{}^{39}c_2}{{}^{52}c_2}$ 2. $1-\frac{{}^{39}c_2}{{}^{52}c_2}$

3. $\frac{39}{52}\times\frac{39}{52}=\frac{9}{16}$ 4. $\frac{{}^{30}c_2}{{}^{52}c_2}$

224. The probability of drawing a card which is a spade or a king from a well shuffled pack of playing cards is

1. $\frac{2}{13}$ 2. $\frac{3}{13}$ 3. $\frac{4}{13}$ 4. $\frac{5}{13}$

225. A card is drawn from an ordinary pack of 52 playing cards and a gambler bets it as a spade or an ace. The probability that he wins the bet is

1. $\frac{2}{13}$ 2. $\frac{3}{13}$ 3. $\frac{4}{13}$ 4. $\frac{1}{13}$

226. From a well shuffled pack of 52 playing cards two cards are drawn at random. The probability that either both are red or both are kings is

1. $\frac{\left({}^{26}c_2+{}^{4}c_2\right)}{{}^{52}c_2}$ 2. $\frac{\left({}^{26}c_2+{}^{4}c_2-{}^{2}c_2\right)}{{}^{52}c_2}$

3. $\frac{{}^{30}c_2}{{}^{52}c_2}$ 4. $\frac{{}^{39}c_2}{{}^{52}c_2}$

227. In shuffling a pack of cards, four cards are accidentally dropped. The probability that the cards dropped are one from each suit is

1. $\frac{{}^{13}c_4}{{}^{52}c_4}$ 2. $\frac{13^4}{{}^{52}c_4}$ 3. $\frac{{}^{13}c_4}{13^4}$ 4. $\frac{13!}{{}^{52}c_4}$

228. Four persons draw a card each from a well shuffled pack of 52 cards without replacement at random. The probability that they are a card from each suit is

1. $\frac{13\times12\times11\times10}{52^4}$ 2. $\frac{13^4}{{}^{52}c_4}$

3. $\frac{{}^{13}c_4}{{}^{52}c_4}$ 4. $\frac{{}^{13}c_4}{13^4}$

229. Four cards are drawn at random from a well shuffled pack of 52 playing cards. The probability that all the 4 are hearts, but one is a queen is

1. $\frac{{}^{4}c_1\times{}^{12}c_3}{{}^{52}c_4}$ 2. $\frac{{}^{12}c_3}{{}^{52}c_4}$ 3. $\frac{{}^{12}c_4}{{}^{52}c_4}$ 4. $\frac{13^4}{{}^{52}c_4}$

230. From a well shuffled pack of 52 playing cards, four are drawn at random. The probability that all are spades, but one is a king is

1. $\frac{{}^{39}c_4}{{}^{52}c_4}$ 2. $\frac{{}^{12}c_3}{{}^{52}c_4}$ 3. $1-\frac{{}^{39}c_4}{{}^{52}c_4}$ 4. $\frac{{}^{12}c_4}{{}^{52}c_4}$

231. If a card is drawn at random from a well shuffled pack of 52 playing cards, the probability that it is a court card is (Jack, Queen & King are court cards)

1. $\frac{5}{13}$ 2. $\frac{3}{13}$ 3. $\frac{1}{13}$ 4. $\frac{7}{13}$

232. Two cards are drawn from a well shuffled pack of 52 playing cards. The probability that they belong to different colours is

1. $\frac{2\times {}^{13}c_2}{{}^{52}c_2}$ 2. $\frac{{}^{4}c_2\times 13\times 13}{{}^{52}c_2}$

3. $\frac{{}^{26}c_1\times {}^{26}c_1}{{}^{52}c_2}$ 4. $\frac{{}^{13}c_2}{{}^{52}c_2}$

233. Five cards are drawn at random from a well shuffled pack of 52 cards. The probability that out of these 5 there will be just one ace is

1. $\frac{{}^{48}c_5}{{}^{52}c_5}$ 2. $\frac{{}^{4}c_1}{{}^{52}c_5}$ 3. $\frac{{}^{4}c_1\times {}^{48}c_4}{{}^{52}c_5}$ 4. $\frac{{}^{48}c_4}{{}^{52}c_5}$

234. A pack of cards is distributed to four players as in the game of bridge. The probability that a particular player will not get an ace in three consecutive games is

1. $\frac{3\times {}^{48}c_{13}}{{}^{52}c_{13}}$ 2. $\left(\frac{{}^{48}c_{13}}{{}^{52}c_{13}}\right)^3$ 3. $\frac{{}^{48}c_{13}}{{}^{52}c_{13}}$ 4. $\left(\frac{3\times {}^{48}c_{13}}{{}^{52}c_{13}}\right)^3$

235. Three cards are drawn successively with replacement. The probability of obtaining 2 aces and 1 king is

1. $\frac{1}{13^3}$ 2. $\frac{2}{13^3}$ 3. $\frac{3}{13^3}$ 3. $\frac{5}{13^3}$

236. A card is drawn at random from a well shuffled pack of 52 playing cards. The card is replaced after noting its colour. If this experiment is repeated six times, then the probability that the cards drawn consists of 2 hearts, 2 diamonds and 2 black cards is

1. $\frac{1}{4^5}$ 2. $\frac{90}{4^5}$ 3. $\frac{72}{4^5}$ 4. $\frac{36}{4^5}$

237. In selecting 2 cards one at a time with replacement from a deck, the probability that the second is a face card, given that the 1st card was a red card is

1. $\frac{2}{13}$ 2. $\frac{3}{13}$ 3. $\frac{4}{13}$ 4. $\frac{5}{13}$

238. In selecting 2 cards one at a time with replacement from a deck, the probability that the second card is an ace, given that the 1st card was a face card is

1. $\frac{1}{13}$ 2. $\frac{2}{13}$ 3. $\frac{3}{13}$ 4. $\frac{4}{13}$

239. In selecting 2 cards one at a time with replacement from a deck, the probability that the second card is a black card, given that the 1st card was a red card is

1. $\frac{1}{13}$ 2. $\frac{1}{2}$ 3. $\frac{1}{39}$ 4. $\frac{1}{8}$

240. The face cards are removed from a well shuffled pack of 52 cards. Out of the remaining cards 4 are drawn at random. The probability that they belong to different suits is

1. $\frac{13^4}{{}^{52}c_4}$ 2. $\frac{{}^{13}c_4}{{}^{40}c_4}$ 3. $\frac{10^4}{{}^{40}c_4}$ 4. $\frac{13^4}{{}^{40}c_4}$

241. The face cards are removed from a well shuffled pack of 52 cards. Out of the remaining cards 4 are drawn at random. The probability that they belong to different suits and different denominations is

1. $\frac{13^4}{{}^{52}c_4}$ 2. $\frac{{}^{13}c_4}{{}^{40}c_4}$ 3. $\frac{{}^{10}p_4}{{}^{40}c_4}$ 4. $\frac{13^4}{{}^{40}c_4}$

242. A and B alternately cut a card each from a pack of cards with replacement and pack is shuffled after each cut. If A starts the game and the game is continued till one cuts a spade, the respective probabilities of A and B cutting a spade are

1. $\frac{1}{3},\frac{2}{3}$ 2. $\frac{3}{4},\frac{1}{4}$ 3. $\frac{4}{7},\frac{3}{7}$ 4. $\frac{3}{7},\frac{4}{7}$

243. A and B alternately cut a card each from a well shuffled pack of 52 cards with replacement and the pack is shuffled after each cut. If A starts the game and the game is continued till one cuts a spade or club, the respective probabilities of A and B cutting a spade or club card is

1. $\frac{1}{3},\frac{2}{3}$ 2. $\frac{2}{3},\frac{1}{3}$ 3. $\frac{4}{7},\frac{3}{7}$ 4. $\frac{3}{7},\frac{4}{7}$

244. The probability of drawing an honour card from a well shuffled pack of 52 playing cards is (K,Q,J,A are honour cards)

1. $\frac{2}{13}$ 2. $\frac{3}{13}$ 3. $\frac{4}{13}$ 4. $\frac{5}{13}$

245. Two cards are drawn simultaneously from a well shuffled pack of 52 playing cards. The probability that one of them is an ace of hearts is

1. $\frac{1}{13}$ 2. $\frac{1}{26}$ 3. $\frac{1}{39}$ 4. $\frac{1}{52}$

246. A card is drawn from a well shuffled pack of 52 cards numbered 2 to 53. The probability that the number on the card is a prime less than 10 is

1. $\frac{4}{13}$ 2. $\frac{3}{13}$ 3. $\frac{2}{13}$ 4. $\frac{1}{13}$

247. A card is drawn from a well shuffled pack of 52 cards numbered 2 to 53. The probability that the number on the card is a prime less than 20 is

1. $\frac{4}{13}$ 2. $\frac{3}{13}$ 3. $\frac{2}{13}$ 4. $\frac{1}{13}$

248. A card is drawn from a well shuffled pack of 52 cards numbered 2 to 53. The probability that the number on the card is a prime less than 30 is

1. $\frac{1}{26}$ 2. $\frac{3}{26}$ 3. $\frac{5}{26}$ 4. $\frac{7}{26}$

249. In a game of bridge, the probability of a particular player having all the 13 cards of red colour is

1. $\frac{13^4}{{}^{52}c_{13}}$ 2. $\frac{{}^{26}c_{13}}{{}^{52}c_{13}}$ 3. $\frac{13\times 4}{{}^{52}c_{13}}$ 4. $\frac{13^2}{{}^{52}c_{13}}$

250. In a bridge game, the probability that a specified player has at least one ace is

1. $\frac{{}^{48}c_{13}}{{}^{52}c_{13}}$ 2. $\frac{{}^{4}c_1}{{}^{52}c_{13}}$ 3. $1-\frac{{}^{48}c_{13}}{{}^{52}c_{13}}$ 4. $1-\frac{{}^{4}c_1}{{}^{52}c_{13}}$

251. Two cards are drawn from a well shuffled pack of 52 playing cards. The probability that one is a heart card and the other is not a heart card is

1. $\frac{7}{34}$ 2. $\frac{9}{34}$ 3. $\frac{13}{34}$ 4. $\frac{15}{34}$

252. From a well shuffled pack of 52 cards, 2 cards are

drawn, one at a time with replacement at random. The probability that both the cards are not queens is

1. $\frac{1}{16}$ 2. $\frac{1}{69}$ 3. $\frac{144}{169}$ 4. $\frac{1}{8}$

253. A card is drawn at random from a well shuffled pack of 52 cards. Again a card is drawn at random from the remaining cards. The probability that one is a king and the other is a queen is

1. $\frac{4}{663}$ 2. $\frac{8}{663}$ 3. $\frac{1}{221}$ 4. $\frac{2}{663}$

254. A box contains 40 balls of the same shape and weight. Among the balls 10 are white, 16 are red and the rest are black, the probability that a ball drawn from the box is not a black is

1. $\frac{1}{4}$ 2. $\frac{2}{5}$ 3. $\frac{13}{20}$ 4. $\frac{1}{20}$

255. A box contains 40 balls of the same shape and weight. Among the balls 10 are white, 16 are red and the rest are black, if two balls are drawn, the probability that one is red and one is black is

1. $\frac{3}{4}$ 2. $\frac{56}{195}$ 3. 1 4. $\frac{1}{4}$

256. The probability that a teacher will give a surprise test during any class meeting is 3/5. If a student is absent on two days, then the probability that he will miss at least one test is

1. 9/25 2. 4/25 3. 21/25 4. 13/25

257. There are 4 red, 3 black and 5 white balls in a bag. If a ball is drawn at random, the probability that it may be either red or black ball is

1. $\frac{1}{4}$ 2. $\frac{5}{12}$ 3. $\frac{7}{12}$ 4. $\frac{9}{12}$

258. There are 4 red, 3 black and 5 white balls in a bag. The probability of drawing 3 balls of different colour is

1. $\frac{5}{11}$ 2. $\frac{3}{11}$ 3. $\frac{1}{11}$ 4. $\frac{7}{11}$

259. There are 4 red, 3 black and 5 white balls in a bag. The probability of drawing 2 balls of the same colour and one is of different colour is

1. $\frac{5}{44}$ 2. $\frac{15}{44}$ 3. $\frac{29}{44}$ 4. $\frac{131}{195}$

260. A bag contains 3 red, 4 white and 7 black balls. Two balls are drawn at random. The probability that they are of different colours is

1. $\frac{30}{91}$ 2. $\frac{61}{91}$ 3. $\frac{31}{91}$ 4. $\frac{60}{91}$

261. There are 5 green, 6 black and 7 white balls in a bag. A ball is drawn at random from the bag. The probability that it may be either green or black is

1. $\frac{5}{18}$ 2. $\frac{6}{18}$ 3. $\frac{11}{18}$ 4. $\frac{13}{18}$

262. A bag contains 2 white, 3 black and 4 green balls. One ballis drawn at random from the bag. The second ball is drawn at random from the remaining balls. The probability that 1st one is white and the 2nd is black is

1. $\frac{2}{7}$ 2. $\frac{3}{7}$ 3. $\frac{1}{12}$ 4. $\frac{4}{7}$

263. A bag contains 3 white, 2 black and 4 red balls. The probability of drawing a white, a black and a red ball in succession in that order without replacement is

1. $\frac{8}{243}$ 2. $\frac{1}{21}$ 3. $\frac{5}{21}$ 4. $\frac{3}{21}$

264. There are 6 red and 5 black balls in a bag. A ball is drawn from the bag at random and without replacing it another ball is drawn at random. The probability that both the balls drawn may be black is

1. $\frac{2}{11}$ 2. $\frac{3}{11}$ 3. $\frac{6}{11}$ 4. $\frac{5}{11}$

265. There are 6 red and 5 black balls in a bag. A ball is drawn from the bag at random and without replacing it an other ball is drawn at random. The probability that both the balls drawn may be red is

1. $\frac{2}{11}$ 2. $\frac{3}{11}$ 3. $\frac{6}{11}$ 4. $\frac{5}{11}$

266. There are 6 red and 5 black balls in a bag. A ball is drawn from the bag at random and without replacing it an other ball is drawn at random. The probability that one is red and one is black is

1. $\frac{2}{11}$ 2. $\frac{3}{11}$ 3. $\frac{6}{11}$ 4. $\frac{5}{11}$

267. There are 6 red and 5 black balls in a bag. A ball is drawn from the bag at random and without replacing it an other ball is drawn at random. The probability that 1st one is red and the second is black is

1. $\frac{2}{11}$ 2. $\frac{3}{11}$ 3. $\frac{6}{11}$ 4. $\frac{5}{11}$

268. A bag contains 2 white, 3 black and 4 green balls. Two balls are drawn one after another with replacement. The probability that 1st one is white and second one is black is

1. $\frac{5}{27}$ 2. $\frac{1}{9}$ 3. $\frac{2}{27}$ 4. $\frac{4}{27}$

269. A bag contains 2 white, 3 black and 4 green balls. Two balls are drawn one after another with replacement. The probability that one is white and one is black is

1. $\frac{5}{27}$ 2. $\frac{1}{9}$ 3. $\frac{2}{27}$ 4. $\frac{4}{27}$

270. A bag contains 3 white, 2 black and 4 red balls. Three balls are drawn one after another with replacement at random. The probability of drawing a white, a black and a red ball in succession in that order is

1. $\frac{1}{21}$ 2. $\frac{5}{21}$ 3. $\frac{8}{243}$ 4. $\frac{2}{243}$

271. There are 6 red and 5 black balls in a bag. Two balls are drawn at random one after another with replacement. The probability that both the balls drawn may be red is

1. $\frac{30}{121}$ 2. $\frac{25}{121}$ 3. $\frac{18}{121}$ 4. $\frac{36}{121}$

272. There are 6 red and 5 black balls in a bag. Two balls

are drawn at random one after another with replacement. The probability that both the balls drawn may be black is

1. $\frac{30}{121}$ 2. $\frac{25}{121}$ 3. $\frac{36}{121}$ 4. $\frac{36}{221}$

273. There are 6 red and 5 black balls in a bag. Two balls are drawn at random one after another with replacement. The probability that 1st one is red and the second one is black is

1. $\frac{30}{121}$ 2. $\frac{60}{121}$ 3. $\frac{36}{221}$ 4. $\frac{36}{121}$

274. There are 6 red and 5 black balls in a bag. Two balls are drawn at random one after another with replacement. The probability that one is red and one is black is

1. $\frac{30}{121}$ 2. $\frac{60}{121}$ 3. $\frac{36}{121}$ 4. $\frac{36}{221}$

275. The probability of drawing 4 white and 2 black balls in two drawings in succession from a bag containing 1 red, 4 black and 6 white balls, if the drawing is without replacement is

1. $\frac{{}^{6}c_4}{{}^{11}c_4}\times\frac{{}^{4}c_2}{{}^{11}c_2}$ 2. $\frac{{}^{6}c_4}{{}^{11}c_4}\times\frac{{}^{4}c_2}{{}^{7}c_2}$

3. $\frac{{}^{10}c_6}{{}^{11}c_6}$ 4. $\frac{{}^{10}c_2}{{}^{11}c_2}$

276. The probability of drawing 4 white and 2 black balls in two drawings in succession from a bag containing 1 red, 4 black and 6 white balls, if the drawing is with replacement is

1. $\frac{{}^{6}c_4}{{}^{11}c_4}\times\frac{{}^{4}c_2}{{}^{11}c_2}$ 2. $\frac{{}^{6}c_4}{{}^{11}c_4}\times\frac{{}^{4}c_2}{{}^{7}c_2}$

3. $\frac{{}^{10}c_6}{{}^{11}c_6}$ 4. $\frac{{}^{10}c_2}{{}^{11}c_2}$

277. A bag contains 10 white and 8 black balls. Two successive drawings of 2 balls are made. The probability that the 1st draw will give 2 white and the 2nd draw will give 2 black if the drawing is without replacement is

1. $\frac{{}^{10}c_2+{}^{8}c_2}{{}^{18}c_2}$ 2. $\frac{{}^{10}c_2}{{}^{18}c_2}\times\frac{{}^{8}c_2}{{}^{16}c_2}$

3. $\frac{{}^{10}c_2}{{}^{18}c_2}\times\frac{{}^{8}c_2}{{}^{18}c_2}$ 4. $\frac{{}^{12}c_2}{{}^{18}c_2}\times\frac{{}^{6}c_2}{{}^{18}c_2}$

278. A bag contains 10 white and 8 black balls. Two successive drawings of 2 balls are made. The probability that the 1st draw will give 2 white and the 2nd draw will give 2 black if the drawing is with replacement is

1. $\frac{{}^{10}c_2+{}^{8}c_2}{{}^{18}c_2}$ 2. $\frac{{}^{10}c_2}{{}^{18}c_2}\times\frac{{}^{8}c_2}{{}^{16}c_2}$

3. $\frac{{}^{10}c_2}{{}^{18}c_2}\times\frac{{}^{8}c_2}{{}^{18}c_2}$ 4. $\frac{{}^{12}c_2}{{}^{18}c_2}\times\frac{{}^{6}c_2}{{}^{18}c_2}$

279. A bag contains 8 red and 5 white balls. Two successive drawings of 3 balls are made. The probability that the 1st draw will give 3 white and the 2nd draw will give 3 red balls is if the drawing is with replacement is

1. $\frac{{}^{5}c_3}{{}^{13}c_3}\times\frac{{}^{8}c_3}{{}^{10}c_3}$ 2. $\frac{{}^{5}c_3}{{}^{13}c_3}\times\frac{{}^{8}c_3}{{}^{13}c_3}$

3. $\frac{{}^{5}c_3+{}^{8}c_3}{{}^{13}c_3}$ 4. $\frac{{}^{5}c_3\times{}^{8}c_3}{{}^{13}c_3}$

280. A bag contains 8 red and 5 white balls. Two successive drawings of 3 balls are made. The probability that the 1st draw will give 3 white and the 2nd draw will give 3 red balls is if the drawing is without replacement is

1. $\frac{{}^{8}c_3}{{}^{13}c_3}\times\frac{{}^{5}c_3}{{}^{10}c_3}$ 2. $\frac{{}^{5}c_3}{{}^{13}c_3}\times\frac{{}^{8}c_3}{{}^{13}c_3}$

3. $\frac{{}^{5}c_3+{}^{8}c_3}{{}^{13}c_3}$ 4. $\frac{{}^{5}c_3\times{}^{8}c_3}{{}^{13}c_3}$

281. Out of 10 balls in a bag 3 are red. The probability that there will be at least one red ball in a draw of 2 balls is

1. $\frac{7}{15}$ 2. $\frac{8}{15}$ 3. $\frac{6}{15}$ 4. $\frac{9}{15}$

282. A bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one ball is drawn from each, the probability that both are white is

1. $\frac{13}{24}$ 2. $\frac{5}{24}$ 3. $\frac{1}{4}$ 4. $\frac{2}{14}$

283. A bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one ball is drawn from each, the probability that both are black is

1. $\frac{13}{24}$ 2. $\frac{5}{24}$ 3. $\frac{1}{14}$ 4. $\frac{2}{14}$

284. A bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one ball is drawn from each, the probability that one is white and one is black is

1. $\frac{13}{24}$ 2. $\frac{5}{24}$ 3. $\frac{1}{14}$ 4. $\frac{2}{14}$

285. A bag contains 5 white and 3 black balls, 4 balls are successively drawn out and not replaced. The chance that they are alternately of different colours is

1. $\frac{1}{7}$ 2. $\frac{1}{14}$ 3. $\frac{1}{21}$ 4. $\frac{1}{28}$

286. A bag contains 3 white, 3 black and 2 red balls. One by one 3 balls are drawn without replacing them. For only the 3rd ball to be red the probability is

1. $\frac{1}{28}$ 2. $\frac{3}{28}$ 3. $\frac{5}{28}$ 4. $\frac{7}{28}$

287. The probability of drawing two red balls in succession from a bag containing 4 red and 5 black balls, when the ball that is drawn 1st is not replaced is

1. $\frac{11}{81}$ 2. $\frac{4}{9}$ 3. $\frac{1}{6}$ 4. $\frac{1}{3}$

288. From a bag containing 4 white and 5 black balls 3 are drawn at random. The odds against these being all black balls is
1. 5 to 42 2. 37 to 5 3. 5 to 37 4. 42 to 5

289. Box A contains 3 red and 2 black balls. Box B contains 2 red and 3 black balls. One ball is drawn at random from box A and placed in box B. Then one ball is drawn at random from box B and placed in bag A. The probability that the composition of the balls in the two boxes remains unaltered is
1. $\frac{9}{30}$ 2. $\frac{8}{30}$ 3. $\frac{17}{30}$ 4. $\frac{3}{30}$

290. A bag contains 10 balls out of which two are red, three are blue and 5 are black. Three balls are drawn at random from the bag. The probability that the balls are of the same colour is
1. $\frac{9}{120}$ 2. $\frac{11}{120}$ 3. $\frac{13}{120}$ 4. $\frac{17}{120}$

291. An urn contains 25 balls numbered 1 through 25. Two balls are drawn from the urn with replacement. The probability that both the balls drawn have odd numbers on them is
1. $\frac{26}{625}$ 2. $\frac{69}{625}$ 3. $\frac{169}{625}$ 4. $\frac{126}{625}$

292. A bag contains 25 balls numbered 1 to 25. One ball is drawn at random. The probability that the number on the ball drawn will be a multiple of 5 is
1. $\frac{4}{5}$ 2. $\frac{3}{5}$ 3. $\frac{2}{5}$ 4. $\frac{1}{5}$

293. A bag contains 25 balls numbered 1 to 25. One ball is drawn at random. The probability that the number on the ball drawn will be a multiple of 5 or 6 is
1. $\frac{3}{25}$ 2. $\frac{7}{25}$ 3. $\frac{9}{25}$ 4. $\frac{5}{25}$

294. A box contains 90 good and 10 defective screws. If 10 screws are selected at random the probability that none is defective is
1. $\frac{90}{100}$ 2. $1-\frac{90}{100}$ 3. $\frac{{}^{90}c_{10}}{{}^{100}c_{10}}$ 4. $1-\frac{{}^{90}c_{10}}{{}^{100}c_{10}}$

295. 3 mangoes and 3 apples are in a box. If two fruits are chosen at random, the probability that one is a mango and the other is an apple is
1. $\frac{3}{5}$ 2. $\frac{5}{6}$ 3. $\frac{1}{36}$ 4. $\frac{7}{36}$

296. A box consists of 12 good pencils, 6 with minor defects and two with major defects. A pencil is chosen at random. The probability that this pencil is not defective is
1. $\frac{3}{5}$ 2. $\frac{3}{10}$ 3. $\frac{1}{5}$ 4. $\frac{1}{3}$

297. An urn contains 7 green and 5 yellow balls. Two balls are drawn at random. The probability that both the balls are of same colour is
1. $\frac{21}{66}$ 2. $\frac{10}{66}$ 3. $\frac{31}{66}$ 4. $\frac{11}{66}$

298. In a bag there are N balls out of which R are red. If n balls are drawn at random from the bag, the probability that r of them are red is
1. $\frac{{}^{n}c_{r}}{{}^{N}c_{r}}$ 2. $\frac{{}^{R}c_{r}}{{}^{N}c_{r}}$
3. $\frac{{}^{R}c_{r}\times{}^{(N-R)}c_{n-r}}{{}^{N}c_{n}}$ 4. $\frac{{}^{N}c_{r}}{{}^{R}c_{r}}$

299. Three balls are drawn from a collection of 7 white, 12 green and 4 red balls. The probability that each is of different colour is
1. $\frac{48}{253}$ 2. $\frac{64}{253}$ 3. $\frac{23}{253}$ 4. $\frac{72}{253}$

300. Four tickets numbered 00, 01, 10, 11 are placed in a bag. A ticket is drawn at random and replaced. Again a ticket is drawn at random. The probability that the sum of the numbers on the tickets drawn is 21
1. $\frac{1}{4}$ 2. $\frac{1}{8}$ 3. $\frac{1}{16}$ 4. $\frac{1}{12}$

301. 3 red and 4 white balls of different sizes are arranged in a row at random. The probability that no two balls of the same colour are together is
1. $\frac{6}{35}$ 2. $\frac{3}{35}$ 3. $\frac{1}{35}$ 4. $\frac{9}{35}$

302. One bag contains 7 red marbles and three white marbles. Three marbles are drawn from the bag in succession without replacement. The probability that the 1st two are red and third is white is
1. $\frac{7}{39}$ 2. $\frac{8}{17}$ 3. $\frac{1}{3}$ 4. $\frac{7}{40}$

303. In a department there are two Professors, four Readers and 6 Lecturers. A committee of three persons is to be formed out of the staff of the department. The probability that the committee consists of at least two lecturers is
1. $\frac{1}{4}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{1}{8}$

304. From a group of 3 mathematicians, 4 statisticians and 5 economists, a committee of 4 is selected by lottery. The probability that the committee consists of 4 economists is
1. $\frac{{}^{7}c_{4}}{{}^{12}c_{4}}$ 2. $\frac{{}^{4}c_{4}}{{}^{12}c_{4}}$ 3. $\frac{{}^{5}c_{4}}{{}^{12}c_{4}}$ 4. $\frac{{}^{13}c_{2}}{{}^{12}c_{4}}$

305. From a group of 3 mathematicians, 4 statisticians and 5 economists, a committee of 4 is selected by lottery. The probability that the committee consists of 2 mathematicians and 2 statisticians is
1. $\frac{{}^{13}c_{2}}{{}^{12}c_{4}}$ 2. $\frac{{}^{4}c_{2}}{{}^{12}c_{4}}$ 3. $\frac{{}^{3}c_{2}\times{}^{4}c_{2}}{{}^{12}c_{4}}$ 4. $\frac{{}^{7}c_{4}}{{}^{12}c_{4}}$

306. Four persons are chosen at random from a group containing 3 men, 2 women and 4 children. The probability that exactly two of them will be children is

1. $\frac{5}{21}$ 2. $\frac{6}{21}$ 3. $\frac{10}{21}$ 4. $\frac{12}{21}$

307. Five men in a company of 20 are graduates. If 3 men are picked out at random. The probability that at least one is a graduate is

1. $\frac{^{15}c_3}{^{20}c_3}$ 2. $\frac{^{5}c_3}{^{20}c_3}$ 3. $1-\frac{^{15}c_3}{^{20}c_3}$ 4. $1-\frac{^{5}c_3}{^{20}c_3}$

308. From 7 gentlemen and 4 ladies, a committee of 5 is to be formed. The probability that this can be done so as to include at least one lady is

1. $\frac{^{7}c_5}{^{11}c_5}$ 2. $\frac{^{4}c_1}{^{11}c_5}$ 3. $1-\frac{^{7}c_5}{^{11}c_5}$ 4. $1-\frac{^{4}c_1}{^{11}c_5}$

309. A cricket 11 is to be selected at random out of 15 players of whom 4 are bowlers. The probability that at least 3 bowlers will be there

1. $\frac{\left(^{4}c_3+{}^{4}c_4\right)}{^{15}c_{11}}$ 2. $\frac{^{4}c_4}{^{15}c_{11}}$

3. $\frac{\left(^{4}c_3\times{}^{11}c_8+{}^{4}c_4\times{}^{11}c_7\right)}{^{15}c_{11}}$ 4. $\frac{^{4}c_3}{^{15}c_{11}}$

310. Six boys and six girls are to sit in a row at random. The probability that all the 6 girls sit together is

1. $\frac{\angle 6\angle 6}{\angle 12}$ 2. $\frac{\angle 6\angle 7}{\angle 12}$ 3. $\frac{2\angle 6\angle 6}{\angle 12}$ 4. $\frac{2\angle 6\angle 7}{\angle 12}$

311. Six boys and six girls are to sit in a row at random. The probability that all the six girls and all the six boys sit together is

1. $\frac{\angle 6\angle 6}{\angle 12}$ 2. $\frac{\angle 6\angle 7}{\angle 12}$ 3. $\frac{2\angle 6\angle 6}{\angle 12}$ 4. $\frac{2\angle 6\angle 7}{\angle 12}$

312. The probability that all the vowels of the word EAMCET come together, when the letters are arranged at random is

1. $\frac{1}{5}$ 2. $\frac{1}{6}$ 3. $\frac{1}{7}$ 4. $\frac{1}{8}$

313. If the letters of the word MISSISSIPPI are arranged at random, the probability that all the 4 S's appear consecutively is

1. $\frac{\angle 8}{\angle 11}$ 2. $\frac{\angle 4}{\angle 11}$ 3. $\frac{\angle 8\angle 4}{\angle 11}$ 4. $\frac{\angle 6}{\angle 11}$

314. If n students are to be seated around a round table at random, the probability that two particular students will be together is

1. $\frac{1}{n-1}$ 2. $\frac{2}{n-1}$ 3. $\frac{3}{n-1}$ 4. $\frac{4}{n-1}$

315. If 10 persons are to sit around a round table, the odds against two specified persons sitting together is

1. $\frac{1}{9}$ 2. $\frac{2}{9}$ 3. 7 to 2 4. 2 to 7

316. 4 boys and 7 girls are to sit in a row at random. The probability that no two boys will sit together is

1. $\frac{\angle 7\times\angle 4}{\angle 11}$ 2. $\frac{\angle 7\times{}^{8}p_4}{\angle 11}$

3. $\frac{\angle 7\times{}^{8}c_4}{\angle 11}$ 4. $\frac{\angle 7\times\angle 8}{\angle 11}$

317. If the letters of the word ASSASSIN are written in a row at random, the probability that no two S's come together is

1. $\frac{1}{7}$ 2. $\frac{2}{7}$ 3. $\frac{1}{14}$ 4. $\frac{3}{14}$

318. 10 gentlemen and 6 ladies are to sit for a dinner at a round table. The probability that no two ladies sit together is

1. $\frac{\angle 9\times\angle 5}{\angle 15}$ 2. $\frac{\angle 9\times{}^{10}p_6}{\angle 15}$

3. $\frac{\angle 9\times{}^{10}c_6}{\angle 15}$ 4. $\frac{\angle 9\times{}^{10}c_5}{\angle 15}$

319. Six boys and six girls are to sit in a row at random. The probability that boys and girls sit alternately is

1. $\frac{\angle 6\times{}^{7}p_6}{\angle 12}$ 2. $\frac{\angle 6\angle 6}{\angle 12}$

3. $\frac{2\angle 6\angle 6}{\angle 12}$ 4. $\frac{2\angle 6}{\angle 12}$

320. Six boys and six girls are to sit around a round table. The probability that boys and girls sit alternately is

1. $\frac{\angle 5\angle 5}{\angle 11}$ 2. $\frac{\angle 5\angle 6}{\angle 11}$ 3. $\frac{\angle 6\angle 6}{\angle 12}$ 4. $\frac{\angle 5\angle 6}{\angle 12}$

321. 100 tickets are numbered as 00, 01, 02 ..... 09, 10, 11, 12, ... 99 out of them one ticket is drawn at random. The probability that the sum of the digits of the number on the ticket is 9 is

1. $\frac{7}{100}$ 2. $\frac{9}{100}$ 3. $\frac{1}{10}$ 4. $\frac{1}{100}$

322. 100 tickets are numbered as 00, 01, 02, ... 09, 10, 11, 12, ... 99 out of them one ticket is drawn at random. The probability that the product of the digits of the number on the ticket is 0 is

1. $\frac{1}{10}$ 2. $\frac{19}{100}$ 3. $\frac{1}{5}$ 4. $\frac{1}{15}$

323. n biscuits of different shape and size are to be distributed to N beggars at random. The probability that a particular beggar receives r $(r<n)$ biscuits is

1. $\frac{^{n}c_r}{N^n}$ 2. $\frac{^{n}c_r\times{}^{n-1}c_{n-r}}{^{n}c_n}$

3. $\frac{^{n}c_r\times(N-1)^{n-r}}{N^n}$ 4. $1-\frac{^{n}c_r}{N^n}$

324. 10 pens of different shape and size are to be distributed to 6 students at random. The probability that a particular student receives 4 pens is

1. $\frac{^{10}c_4}{^{10}c_6}$ 2. $\frac{^{10}c_4}{10^6}$ 3. $\frac{^{10}c_4\times 5^6}{6^{10}}$ 4. $\frac{^{10}c_4\times 5^6}{3^{10}}$

325. If n letters are placed into n addressed envelopes at random, the probability that atleast one letter will go into wrongly addressed envelope is

1. $\frac{1}{n}$ 2. $\frac{n-1}{n}$ 3. $1-\frac{1}{\angle n}$ 4. $\frac{1}{\angle n}$

326. From a set of 17 cards numbered 1 to 17, one cared is drawn at random. The probability that the number on the card is divisible by 3 or 5 is

1. $\frac{5}{17}$ 2. $\frac{6}{17}$ 3. $\frac{7}{17}$ 4. $\frac{8}{17}$

327. The probability that a randomly chosen number from a set of 100 natural numbers is divisible by 4 or 6 is

1. $\frac{41}{100}$ 2. $\frac{33}{100}$ 3. $\frac{37}{100}$ 4. $\frac{3}{100}$

328. The chance that Doctor A will diagonise disease X correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death after wrong diagnosis is 70%. A patient of Doctor A who had disease X died. The probability that his disease was diagonised correctly is

1. 5/13 2. 6/13 3. 2/13 4. 7/13

329. Assuming equal probability for the days, the probability that the birthdays of seven people will fall on seven different days of the week is

1. $\frac{1}{7^6}$ 2. $\frac{{}^7c_7}{7^7}$ 3. $\frac{{}^7p_7}{7^7}$ 4. $\frac{1}{6^7}$

330. Assuming equal probability for the days, the probability that the birthdays of five people will fall on five different days of the week is

1. $\frac{{}^5p_5}{5^5}$ 2. $\frac{{}^7p_5}{7^5}$ 3. $\frac{{}^7c_5}{7^5}$ 4. $\frac{{}^5c_5}{5^5}$

331. Assuming that a year consits of 365 days, the probability that a group of n people $(n \le 365)$ have all different birthdays is

1. $\frac{365}{365^n}$ 2. $\frac{n}{365^n}$ 3. $\frac{{}^{365}p_n}{365^n}$ 4. $\frac{{}^n p_n}{365^n}$

332. Assuming that a year consits of 365 days, the probability that a group of 30 people have all different birthdays is

1. $\frac{365}{365^{30}}$ 2. $\frac{30}{365^{30}}$ 3. $\frac{{}^{365}p_{30}}{365^{30}}$ 4. $\frac{{}^{30}P_{30}}{365^{30}}$

333. The probability that the birthdays of 12 girls will fall on 12 different calender months of a year is

1. $\frac{1}{12^{11}}$ 2. $\frac{{}^{12}c_{12}}{12^{12}}$ 3. $\frac{{}^{12}p_{12}}{12^{12}}$ 4. $\frac{1}{12^5}$

334. The probability that the birthdays of 6 girls will fall on 6 different calender months of a year is

1. $\frac{1}{12^5}$ 2. $\frac{{}^6c_6}{12^6}$ 3. $\frac{{}^{12}p_6}{12^6}$ 4. $\frac{1}{12^{11}}$

335. There are 25 stamps numbered from 1 to 25 in a box. If a stamp is drawn at random from the box. The probability that the number on the stamp drawn is a prime number is

1. $\frac{12}{25}$ 2. $\frac{13}{25}$ 3. $\frac{9}{25}$ 4. $\frac{6}{25}$

336. There are 25 stamps numbered from 1 to 25 in a box. If a stamp is drawn at random from the box. The probability that the number on the stamp drawn is a multiple of 3

1. $\frac{9}{25}$ 2. $\frac{8}{25}$ 3. $\frac{7}{25}$ 4. $\frac{6}{25}$

337. Two cards are drawn at random from 10 cards numbered 1 to 10. The probability that their sum is odd if both the cards are drawn together

1. $\frac{1}{3}$ 2. $\frac{4}{9}$ 3. $\frac{5}{9}$ 4. $\frac{1}{4}$

338. Two cards are drawn at random from 10 cards numbered 1 to 10. The probability that their sum is even if both the cards are drawn together

1. $\frac{1}{3}$ 2. $\frac{4}{9}$ 3. $\frac{5}{9}$ 4. $\frac{1}{4}$

339. From a box containing 10 cards numbered 1 to 10, four cards are drawn together. The probability that their sum is even is

1. $\frac{1}{2}$ 2. $\frac{11}{21}$ 3. $\frac{10}{21}$ 4. $\frac{1}{21}$

340. From a box containing 10 cards numbered 1 to 10, four cards are drawn together. The probability that their sum is odd is

1. $\frac{1}{2}$ 2. $\frac{11}{21}$ 3. $\frac{10}{21}$ 4. $\frac{1}{21}$

341. Two different digits are chosen at random from the set 1, 2, 3, 4, 5, 6, 7, 8. Then the probability that their sum is equal to 5

1. $\frac{5}{14}$ 2. $\frac{3}{14}$ 3. $\frac{1}{14}$ 4. $\frac{2}{14}$

342. Two different digits are chosen at random from the set 1, 2, 3, 4, 5, 6, 7, 8. Then the probability that their sum will exceed 13 is

1. $\frac{5}{14}$ 2. $\frac{3}{14}$ 3. $\frac{1}{14}$ 4. $\frac{2}{14}$

343. Two different digits are chosen at random from the set 1, 2, 3, 4, 5, 6, 7, 8. Then the probability that both the digits exceed 5 is

1. $\frac{3}{28}$ 2. $\frac{5}{28}$ 3. $\frac{9}{28}$ 4. $\frac{7}{28}$

344. Two different digits are chosen at random from the set 1, 2, 3, 4, 5, 6, 7, 8. Then the probability that both the digits are less than 3 is

1. $\frac{3}{28}$ 2. $\frac{1}{14}$ 3. $\frac{1}{28}$ 4. $\frac{7}{28}$

345. From 100 cards numbered 1 to 100, two cards are drawn one by one with replacement. The probability that both are divisible by 5 is

1. $\frac{1}{5}$ 2. $\frac{1}{10}$ 3. $\frac{1}{25}$ 4. $\frac{1}{15}$

346. From 80 cards numbered 1 to 80, two cards are drawn at random. The probability that the cards have the numbers divisible by 4 is

1. $\frac{15}{316}$ 2. $\frac{17}{316}$ 3. $\frac{19}{316}$ 4. $\frac{21}{316}$

347. Out of numbers 1 to 9, two numbers are chosen at random, so that their sum is even number. The 4.
A player tosses two fair coins. He wins Rs. 5/- if two heads occur, Rs. 2/- if one head occurs and Rs. 1/- if no head occurs. Then how much should he pay to play the game if it is to be fair probability that the two chosen numbers are odd is

1. $\frac{5}{18}$ 2. $\frac{13}{18}$ 3. $\frac{5}{8}$ 4. $\frac{1}{8}$