|  |  |
| --- | --- |
| Question 1  There are 2n different n-bit binary strings  True  False | Question 2  Evaluate the following factorial term 4!  A) 4  B) 24  c) 10  D) 16 |
| Feedback Correct answer: TRUE | Feedback The correct answer is B  4! = 4 x 3 x 2 x 1 |
| Question 3  Evaluate the following factorial term 0!  A) 1  B) 0  C) infinity  D) not mathematically defined | Question 4  Evaluate the binomial coefficient  A) 2.5  B) 10  C) 15  D)20 |
| Feedback The correct answer is A  0! = 1. | Feedback The correct answer is D  =20. |
| Question 5  How many ways are there of choosing 2 people from a group of six?  A) 3  B) 12  c) 15  D) 36  Correct Answer 15 | Question 6 How many ways are there of making an ordered list of 6 distinct elements?  6!  6^2 |
| Feedback The correct answer is c  There are 15 Ways |  |
| **Question 7**  **Do the two following binomial coefficients the same value**  **=**  **True**  **False** | **Question 8**  **Find the cardinality of the union of sets**  **Let A={1,2,3,6}**  **Let B={0,4,5,6}**  **Answer**  **A) 6**  **B) 7**  **C) 8**  **D) 9** |
| **Answer TRUE both are 6** | **Correct Answer B**  **The correct answer is 7** |
| Question 9 The number of ordered lists of r elements chosen from n items  13! / 9! | **Question 10**  **A fair coin coin is flipped 4 times.**  **How many distinct possible outcomes are there?**  **(N.B. an example of an outcome would be {H,T,H,T})**  **A) 4**  **B) 8**  **C) 16**  **D) 64** |
|  | **The correct answer is C) 16** |
| Question 11  From a restaurant's set evening menu, there are three starters, five main courses and three desserts.  Suppose a customer orders an item for course. How many ways are there of making an order.  A) 11  B) 15  C) 45  D) 60 | Question 12  The factorial of 0 is equal to 0.  *0!= 0*   1. TRUE 2. FALSE |
| The Correct Answer is C) 45 | Feedback: False The factorial of 0 is equal to 1. |
| Question 13  Consider all re-arrangements of the words COMPUTER.  How many rearrangements are possible? | **Question 14**  **Consider a coin toss experiment where a coin is flipped three times, with the number of heads was recorded.**  **What is the sample Space of three flips of a coin**   1. **{HHH,HHT,HTH,HTT,THH,THT,TTH,TTT}** 2. **{H,T}** 3. **{0,1,2,3}** 4. **{ {H,T} ,{0,1,2,3} }** |
|  | **Feedback : The correct answer is C) It is the number of heads that we are interested in.** |
| **Question 15**  **Suppose you throw a die twice, noting the number obtained on each throw.**  **You will end up with a sequence of two numbers in the order they are thrown.**  **Let A be the event that the sum of the first two throws is 3.**  **Compute the probability of A.**  **A) 1/6**  **B) 1/12**  **C) 1/18**  **D) 1/36** | **Question 16**  **Suppose you throw a die twice, noting the number obtained on each throw.**  **You will end up with a sequence of two numbers in the order they are thrown.**  **Let B be the event that the sum of the throws is at most 4.**  **Compute the probability of B**  **A) 1/6**  **B) 1/12**  **C) 1/18**  **D) 1/36** |
| **Feedback: The correct answer is C) 1/18** | **Feedback: The correct answer is A) 1/6** |
| **Question 17**  **A college teaches a range of courses including maths, physics and IT.**  **Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject**  **areas.**  **200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.**  **How many students study none of these courses at all?**   1. **60** 2. **70** 3. **90** 4. **120** | **Question 18**  **A college teaches a range of courses including maths, physics and IT.**  **Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject**  **areas.**  **200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.**  **How many students study maths but not physics or IT?**   1. **70** 2. **80** 3. **90** 4. **120** |
| Feedback: The correct answer is C) 90 | Feedback : The correct answer is A) 70 |
| Question 19  A college teaches a range of courses including maths, physics and IT.  Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject  areas.  200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.  How many students study both maths and physics but not IT? (160)   1. 120 2. 210 3. 380 4. 160 | Question 20  A college teaches a range of courses including maths, physics and IT.  Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject  areas.  200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.  How many students study courses from precisely two of these subject  areas?   1. 120 2. 210 3. 380 4. 160 |
| The correct answer is D) 160 | The correct answer is B) 210 |
| **Question 21**  **An ordered sequence of four digits is formed by choosing digits without repetition from the set:**  ***{1, 2, 3, 4, 5, 6, 7}***  **What is the total number of such sequences?**  **A) 780**  **B) 960**  **C) 240**  **D) 640** | **Question 22**  **An ordered sequence of four digits is formed by choosing digits without repetition from the set :**  ***{1, 2, 3, 4, 5, 6, 7}***  **What is the number of sequences which begin with an odd number?**  **A) 780**  **B) 960**  **C) 640**  **D) 480** |
| **Feedback The correct answer is A 780.** | **Feedback The correct answer is D 480.** |
| **Question 23**  **An ordered sequence of four digits is formed by choosing digits without repetition from the set:**  ***{1, 2, 3, 4, 5, 6, 7}***  **What is the number of sequences which end with an odd number?**  **A) 780**  **B) 960**  **C) 640**  **D) 480** | **Question 24**  **An ordered sequence of four digits is formed by choosing digits without repetition from the set:**  ***{1, 2, 3, 4, 5, 6, 7}***  **What is the number of sequences which begin and end with an odd number?**  **A) 720**  **B) 480**  **C) 240**  **D) 640** |
| **Feedback : The correct answer is again D (480).** | **Feedback : The correct answer is C (240).** |
| **Question 25**  **An ordered sequence of four digits is formed by choosing digits without repetition from the set:**  ***{1, 2, 3, 4, 5, 6, 7}***  **What is the number of sequences which begin with an odd number or end with an**  **odd number or both?**  **A) 720**  **B) 480**  **C) 240**  **D) 640** | **Question 26**  **An ordered sequence of four digits is formed by choosing digits without repetition from the set:**  ***{1, 2, 3, 4, 5, 6, 7}***  **What is the number of sequences which begin with an odd number or end with an**  **odd number but not both.**  **A) 720**  **B) 480**  **C) 240**  **D) 640** |
| **Feedback : The correct answer is A (720).** | **Feedback : The correct answer is B (480).** |

1

--READY

2. Binary Strings. Suppose there are n bits. how many binary strings are there (ans 2^n)

--STANDBY

3. Factorial of 5 (5 20 120 25) 120

--READY

4

5. Suppose we have list of 5 distinct items. The number of ordered lists without repetition is 5!

--STANDBY

6. Counting where order is not important : Combinations

7. Permutations Q1 - number of ordered lists of r distinct items chosen from a set of n distinct elements. n=10 r=3

answer: (10!/7!) = 720

--READY

8. Repetition Allowed / Repetition not allowed

9. Choose Operator : 7 choose 2 (21 Ways)

--READY

10. Choose Operator : n choose 0 = 1

--READY

11. Principle of Inclusion/Exclusion

12. Probability: Equiprobable Events. Definition

13. Venn Diagrams

14. Finite Sets : Theorem 4.2 (make FALSE)

--STANDBY

15. Sample Space

16. Size of a Sample Space: Coin Flips(2,3,4,5) 4

--READY

17. Independent Events:

--STANDBY

18. Axioms of Probability: Disjoint events

19. Hypergeometric Distribution - choosing committees

20. Addition Rule P(F or CS) = P(F) + P(CS) - P(F and CS)

--STANDBY

%----------------------------------------------------------------------------------------------------%

Counting,Permutation and Combination

---------------------------------------------------------------------

In an experiment a coin is tossed three times and each time it is noted

whether it comes up heads(H) or tails (T).

The final result is recorded as an ordered triple , such as (H,H,T).

Let A be the event that the last toss comes up as a heads and B

be the event that there is only one head in the triple.

i) Draw a rooted tree to model this process.

ii) Calculate the probabilities of the events A, B, A \cap B , A \cup B.

iii) Are A and B independent events? justify your answer.

In a class of 60 students, in how many ways can

i) a group of three students be chosen?

i) a first, second and third prize be awarded in a class competition if the student can recieve at most one prize.

---------------------------------------------------------------------