1. Which C++ library is commonly used for handling big integers?
   1. <math.h>
   2. <cstdlib>
   3. <iomanip>
   4. **<boost/multiprecision/cpp\_int.hpp>**
2. What is the maximum value that can be stored in a 64-bit integer?
   1. **2^63 - 1**
   2. 2^63
   3. 2^64 - 1
   4. 2^64
3. In C++, what data type should you use to store very large decimal numbers with high precision?
   1. int
   2. **long double**
   3. float
   4. double
4. How many ways are there to arrange the letters in the word "COMPUTE"?
   1. 720
   2. **5040**
   3. 2520
   4. 3628800
5. In how many ways can you choose 3 different books from a shelf of 10 books?
   1. **45**
   2. 90
   3. 120
   4. 720
6. What is the value of 7C3 (7 choose 3)?
   1. 20
   2. **35**
   3. 84
   4. 120
7. How many different combinations are possible when choosing 2 items from a set of 5 items without replacement?
   1. 10
   2. **15**
   3. 20
   4. 25
8. Which of the following is the characteristic equation of the recurrence relation a[n] = 3a[n-1] - 2a[n-2]?
   1. x^2 - 3x + 2 = 0
   2. x^2 - 2x - 3 = 0
   3. **x^2 + 3x - 2 = 0**
   4. x^2 + 2x - 3 = 0
9. What is the solution to the recurrence relation a[n] = 2a[n-1] + 3a[n-2] with initial conditions a[0] = 1 and a[1] = 2?
   1. a[n] = 2^n + 1
   2. a[n] = 2^n - 1
   3. a[n] = 3^n + 2^n
   4. **a[n] = 2^n + 3^n**
10. What is the solution to the recurrence relation a[n] = a[n-1] + 2a[n-2] with initial conditions a[0] = 1 and a[1] = 2?
    1. **a[n] = 2^n + 2**
    2. a[n] = 2^n - 2
    3. a[n] = 2^n + 1
    4. a[n] = 2^n - 1
11. Which method is commonly used to solve linear homogeneous recurrence relations with constant coefficients?
    1. **Characteristic polynomial method**
    2. Fibonacci sequence method
    3. Factorial expansion method
    4. Binomial coefficient method
12. What is the expected value of rolling a fair six-sided die?
    1. 1/6
    2. 1/2
    3. **3.5**
    4. 6
13. In a deck of standard playing cards, what is the expected value of drawing a red card (hearts or diamonds)?
    1. 1/4
    2. 1/2
    3. **3/4**
    4. 1
14. If you toss a fair coin 3 times, what is the expected number of heads?
    1. 0
    2. **1.5**
    3. 2
    4. 2.5
15. What is the expected value of the sum of two fair six-sided dice?
    1. 2.5
    2. 4.5
    3. **7**
    4. 12
16. How many onto (or surjective) functions are there from an n-element (n >= 2) set to a 2-element set?
    1. 2(2^n - 2)
    2. **2^n - 2**
    3. 2^n - 1
    4. 2^n
17. What is the possible number of reflexive relations on a set of 5 elements?
    1. 2^25
    2. **2^20**
    3. 2^15
    4. 2^10
18. Mala has a colouring book in which each English letter is drawn two times. She wants to paint each of these 52 prints with one of k colours, such that the colour-pairs used to colour any two letters are different. Both prints of a letter can also be coloured with the same colour. What is the minimum value of k that satisfies this requirement ?
    1. 9
    2. 8
    3. **7**
    4. 6
19. How many 4-digit even numbers have all 4 digits distinct?
    1. 4536
    2. 2620
    3. **2296**
    4. 2240
20. The number of 4 digit numbers having their digits in non-decreasing order (from left to right) constructed by using the digits belonging to the set {1, 2, 3} is \_\_\_\_.
    1. 12
    2. 13
    3. 14
    4. **15**
21. Two girls have picked 10 roses, 15 sunflowers and 14 daffodils. What is the number of ways they can divide the flowers amongst themselves?
    1. 1638
    2. 2100
    3. **2640**
    4. None of the above
22. What is the primary purpose of solving linear recurrences in C++?
    1. To find the maximum element in an array
    2. **To calculate Fibonacci numbers efficiently**
    3. To sort an array of integers
    4. To search for a specific element in an array
23. Which C++ feature is commonly used to solve linear recurrences recursively?
    1. Arrays
    2. Pointers
    3. **Recursion**
    4. Structures
24. In the context of solving linear recurrences, what does the term "base case" refer to?
    1. A mathematical term used in advanced calculus
    2. **The initial condition or value that stops the recursion**
    3. A computer's primary memory storage
    4. A case statement used in switch statements
25. Which technique is often employed to optimize the recursive calculation of linear recurrences?
    1. Bubble sort
    2. **Memoization**
    3. Dynamic memory allocation
    4. Inheritance
26. What is the time complexity of solving linear recurrences using a recursive approach without memoization?
    1. O(n)
    2. O(log n)
    3. O(n^2)
    4. **O(2^n)**