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(DEEMED TO BE UNIVERSITY)

Accredited by NAAC of UGC with 'A' Grade

Coding Questions for Interview

Q1. Some websites impose certain rules for passwords. Write a method that checks whether a string is a valid password. Suppose the password rules are as follows:

- A password must have at least eight characters.
- A password consists of only letters and digits.
- A password must contain at least two digits.

Write a program that prompts the user to enter a password and displays *Valid Password* if the rules are followed or *Invalid Password* otherwise.

Q2. Write a java program using an array that reads the integers between 1 and 100 and counts the occurrences of each. Assume the input ends with 0. Here is a sample run of the program:

Enter the integers between 1 and 100: 2 5 6 5 4 3 23 43 2 0
2 occurs 2 times
3 occurs 1 time
4 occurs 1 time
5 occurs 2 times
6 occurs 1 time
23 occurs 1 time
43 occurs 1 time

Note that if a number occurs more than one time, the plural word "times" is used in the output.

Q3. Write a java program to convert a decimal integer to its corresponding octal representation.

Q4. Write a method that returns a new array by eliminating the duplicate values in the array using the following method header:

public static int[] eliminateDuplicates(int[] list)

Write a java program that reads in ten integers, invokes the method, and displays the result. Here is the sample run of the program:

Enter ten numbers: 1 2 3 2 1 6 3 4 5 2
The distinct numbers are: 1 2 3 6 4 5

Q5. Write a recursive method in Java to return the greatest common divisor(*gcd*) of two integers m and n, given that in general, *gcd (m, n) =gcd (n, m mod n).*

Q6. Write a recursive method in Java to search an element of an array using *binary search*.

Q7. Write a java program to evaluate the function cos(x) as defined by the infinite series expansion.

$$cos\ (x) = 1 - x^2/2! + x^4/4! - x^6/6! + \ldots.$$

Q8. Write a java program to explain Bubble Sort Algorithm.

Q9. Write a java program to explain Insertion Sort Algorithm.

Q10. Write a recursive Java method that determines if a string s is a palindrome, that is, it is equal to its reverse. Examples of palindromes include 'racecar' and 'gohangasalamiimalasagnahog'.

Q11. Given an unsorted array, *A*, of integers and an integer *k,* write recursive program using Java for rearranging the elements in *A* so that all elements less than or equal to *k* come before any elements larger than *k*.

Q12. Write a java program to implement *Tower of Hanoi* puzzle using recursion.

Q13. Write a program that determines the day number (1 to 366) in a year for a date that is provided as input data. As an example, January 1, 1994, is day 1. December 31, 1993, is day 365. December 31, 1996, is day 366, since 1996 is a leap year. A year is a leap year if it is divisible by four, except that any year divisible by 100 is a leap year only if it is divisible by 400. Your program should accept the month, day, and year as integers. Include a function leap that returns 1 if called with a leap year, 0 otherwise.

Q14. Write a java method to multiply two matrices. The header of the method is:

public static double[][] multiplyMatrix(double[][] a, double[][] b)

To multiply matrix a by matrix b, the number of columns in a must be the same as the number of rows in b, and the two matrices must have elements of the same or compatible types. Let c be the result of the multiplication. Assume the column size of matrix a is n. Each element c_{ij} is $a_{i1} * b_{1j} + a_{i2} * b_{2j} + \ldots. + a_{in} * b_{nj}$

For example, for two 3 * 3 matrices a and b, c is

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \times \begin{pmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{pmatrix} = \begin{pmatrix} c_{11} & c_{12} & c_{13} \\ c_{21} & c_{22} & c_{23} \\ c_{31} & c_{32} & c_{33} \end{pmatrix}$$

where $c_{ij} = a_{i1} * b_{1j} + a_{i2} * b_{2j} + a_{i3} * b_{3j}$.

Q15.A natural number is called a prime if it is bigger than 1 and has no divisors other than 1 and itself. Write a program that takes an integer argument and returns all the primes between 1 and that integer. For example, if the input is 18, you should return (2, 3, 5, 7, 11,13, 17).