**Question 1**

Given an integer n, return *true* if it is a power of two. Otherwise, return *false*.

An integer n is a power of two, if there exists an integer x such that n == 2x.

**Example 1:** Input: n = 1

Output: true

**Example 2:** Input: n = 16

Output: true

**Example 3:** Input: n = 3

Output: false

**Solution**: PYTHON CODE

def isPowerOfTwo(n):

if n <= 0:

return False

while n > 1:

if n % 2 != 0:

return False

n = n // 2

return True

# Take input from the user

n = int(input("Enter an integer: "))

# Check if the entered number is a power of two

result = isPowerOfTwo(n)

# Display the result

print(f"{n} is a power of two: {result}")

**Question 2**

Given a number n, find the sum of the first natural numbers.

**Example 1:**

Input: n = 3

Output: 6

**Example 2:**

Input : 5

Output : 15

SOLUTION: PYTHON CODE

def sum\_of\_natural\_numbers(n):

sum = (n \* (n + 1)) // 2

return sum

# Ask the user for input

n = int(input("Enter a positive integer: "))

result = sum\_of\_natural\_numbers(n)

print("The sum of the first", n, "natural numbers is:", result)

**Question 3**

\*\*\*\*Given a positive integer, N. Find the factorial of N.

**Example 1:**

Input: N = 5

Output: 120

**Example 2:**

Input: N = 4

Output: 24

SOLUTION: PYTHON CODE

def factorial(n):

if n == 0:

return 1

else:

return n \* factorial(n-1)

# Ask the user for input

n = int(input("Enter a positive integer: "))

result = factorial(n)

print("The factorial of", n, "is:", result)

**Question 4**

Given a number N and a power P, the task is to find the exponent of this number raised to the given power, i.e. N^P.

**Example 1 :**

Input: N = 5, P = 2

Output: 25

**Example 2 :** Input: N = 2, P = 5

Output: 32

SOLUTION PYTHON CODE

def calculate\_exponent(base, power):

result = base \*\* power

return result

# Ask the user for input

base = int(input("Enter the base number: "))

power = int(input("Enter the power: "))

result = calculate\_exponent(base, power)

print(base, "raised to the power", power, "is:", result)

**Question 5**

Given an array of integers **arr**, the task is to find maximum element of that array using recursion.

**Example 1:**

Input: arr = {1, 4, 3, -5, -4, 8, 6}; Output: 8

**Example 2:**

Input: arr = {1, 4, 45, 6, 10, -8}; Output: 45

SOLUTION: PYTHON CODE

def find\_maximum(arr):

if len(arr) == 1:

return arr[0]

else:

return max(arr[0], find\_maximum(arr[1:]))

# Ask the user for input

arr = list(map(int, input("Enter the elements of the array (space-separated): ").split()))

result = find\_maximum(arr)

print("The maximum element in the array is:", result)

**Question 6**

Given first term (a), common difference (d) and a integer N of the Arithmetic Progression series, the task is to find Nth term of the series.

**Example 1:**

Input : a = 2 d = 1 N = 5 Output : 6 The 5th term of the series is : 6

**Example 2:**

Input : a = 5 d = 2 N = 10 Output : 23 The 10th term of the series is : 23

SOLUTION: PYTHON CODE

def find\_nth\_term(a, d, N):

nth\_term = a + (N - 1) \* d

return nth\_term

# Ask the user for input

a = int(input("Enter the first term (a): "))

d = int(input("Enter the common difference (d): "))

N = int(input("Enter the value of N: "))

result = find\_nth\_term(a, d, N)

print("The", N, "th term of the series is:", result)

**Question 7**

Given a string S, the task is to write a program to print all permutations of a given string.

**Example 1:**

***Input:***

S = “ABC”

***Output:***

“ABC”, “ACB”, “BAC”, “BCA”, “CBA”, “CAB”

**Example 2:**

***Input:***

S = “XY”

***Output:***

“XY”, “YX”

SOLUTION: PYTHON CODE

def permute\_string(string, start, end):

if start == end:

print("".join(string))

else:

for i in range(start, end + 1):

string[start], string[i] = string[i], string[start]

permute\_string(string, start + 1, end)

string[start], string[i] = string[i], string[start]

# Get input from the user

s = input("Enter a string: ")

# Call the function to print permutations

permute\_string(list(s), 0, len(s) - 1)

**Question 8**

Given an array, find a product of all array elements.

**Example 1:**

Input : arr[] = {1, 2, 3, 4, 5} Output : 120 **Example 2:**

Input : arr[] = {1, 6, 3} Output : 18

SOLUTION: PYTHON CODE

def calculate\_product(arr):

product = 1

for num in arr:

product \*= num

return product

# Get input from the user

arr = list(map(int, input("Enter the elements of the array (space-separated): ").split()))

# Calculate the product

result = calculate\_product(arr)

print("The product of all array elements is:", result)