|  |
| --- |
| **Software Engineering Department - ITU** |
| **SE101T: Programming Fundamentals Lab** |

|  |  |
| --- | --- |
| **Course Instructor: Usama Bin Shakeel** | **Dated: 2/10/2023** |
| **Teaching Assistant: Abeera Ashraf** | **Semester: Fall 2023** |
| **Teaching Assistant: Aasma Waheed** | **Batch: BSSE2023** |

# **Lab 6. Recursive Function Solution**

***Q1. Write a function printNumbers, which takes n as a parameter and print numbers 1 to n through a recursive function.***

|  |
| --- |
| #include <iostream>  // Recursive function to print numbers from 1 to n  void printNumbers(int n) {  // Base case: if n is less than 1, stop recursion  if (n < 1) {  return;  }  // Recursively print numbers from 1 to n-1  printNumbers(n - 1);  // Print the current number  std::cout << n << " ";  }  int main() {  int n;  // Get input from the user  std::cout << "Enter a positive integer (n): ";  std::cin >> n;  // Call the recursive function to print numbers  std::cout << "Numbers from 1 to " << n << " are: ";  printNumbers(n);  return 0;  } |

***Q2. Write code in sumNumbers function, which will take n as parameter and calculate the sum of the first n natural numbers using recursion.***

|  |
| --- |
| #include <iostream>  // Recursive function to calculate the sum of the first n natural numbers  int sumNumbers(int n) {  // Base case: if n is 0, the sum is 0  if (n == 0) {  return 0;  }  // Recursive case: sum of the first n natural numbers is n + sum of (n-1) natural numbers  return n + sumNumbers(n - 1);  }  int main() {  int n;  // Get input from the user  std::cout << "Enter a positive integer (n): ";  std::cin >> n;  // Call the recursive function to calculate the sum  int result = sumNumbers(n);  // Display the result  std::cout << "The sum of the first " << n << " natural numbers is: " << result << std::endl;  return 0;  } |

***Q3. Write a function printTable, which prints a table of a number from 1 to 10. Eg. if 3 given as parameter to a function it will display following***

***3 x 1 = 3***

***3 x 2 = 6***

***3 x 3 = 9***

***3 x 4 = 12***

***3 x 5 = 15***

***3 x 6 = 18***

***3 x 7 = 21***

***3 x 8 = 24***

***3 x 9 = 27***

***3 x 10 = 30***

|  |
| --- |
| #include <iostream>  // Recursive function to calculate the sum of the first n natural numbers  int sumNumbers(int n) {  // Base case: if n is 0, the sum is 0  if (n == 0) {  return 0;  }  // Recursive case: sum of the first n natural numbers is n + sum of (n-1) natural numbers  return n + sumNumbers(n - 1);  }  int main() {  int n;  // Get input from the user  std::cout << "Enter a positive integer (n): ";  std::cin >> n;  // Call the recursive function to calculate the sum  int result = sumNumbers(n);  // Display the result  std::cout << "The sum of the first " << n << " natural numbers is: " << result << std::endl;  return 0;  } |

***Q4. Write a function named sumDigits, to implement a recursive function to calculate the sum of digits of a given number. The function should return the integer type result***

|  |
| --- |
| #include <iostream>  // Recursive function to calculate the sum of digits of a given number  int sumDigits(int number) {  // Base case: if the number is a single digit, return the number itself  if (number < 10) {  return number;  }  // Recursive case: sum of digits is the last digit + sum of digits of the remaining number  return number % 10 + sumDigits(number / 10);  }  int main() {  int num;  // Get input from the user  std::cout << "Enter a positive integer: ";  std::cin >> num;  // Call the recursive function to calculate the sum of digits  int result = sumDigits(num);  // Display the result  std::cout << "The sum of digits of " << num << " is: " << result << std::endl;  return 0;  } |

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_