Bangladesh University of Business and Technology
Department of Computer Science and Engineering

CSE 232: Data Structures Lab

Solution to Lab 01 Tasks

Task 1

Write a program which will take a positive integer as input, calculate its factorial, and print it.

Sample Input: 5 **Sample Input:** 10	**Sample Output:** 120 **Sample Output:** 3628800

Sample Solution:

```cpp
#include<iostream>
using namespace std;

int fact(int n){
    if (n==1) return 1;
    else return n*fact(n-1);
}

int main(){
    int num;
    cin>>num;
    cout<<fact(num)<<endl;
}
```

Task 2

Write a program to find the nth Fibonacci number.

Sample Input: 5 **Sample Input:** 8	**Sample Output:** 3 **Sample Output:** 13

Sample Solution:

```cpp
#include <iostream>
using namespace std;

int fib(int n){
    if (n == 1) return 0;
    if (n <= 3) return 1;
    return fib(n - 1) + fib(n - 2);
}

int main(){
    int num;
    cin >> num;
    cout << fib(num) << endl;
}
```

Task 3

Let's consider a word too long if its length is strictly more than 10 characters. All too long words should be replaced with a special abbreviation.
The abbreviation is made like this: we write down the first and the last letter of a word and between them, we write the number of letters between the first and the last letters.
Thus, "localization" will be spelled as "l10n", and "internationalization" will be spelled as "i18n".
If the word is not too long, then it should not undergo any changes. So, "line" will be spelled as "line".
You have to write a program which will take a word as input. If it's too long, print the abbreviation. If it's not too long, print it as it is.

Sample Input: `localization`	**Sample Output:** `l10n`
Sample Input: `line`	**Sample Output:** `line`
Sample Input: `pneumonoultramicroscopicsilicovolcanoconiosis`	**Sample Output:** `p43s`

Sample Solution:

```cpp
#include <iostream>
using namespace std;
int main()
{
    string str;
    cin >> str;
    if (str.size() > 10)
        cout << str[0] << str.size() - 2 << str[str.size() - 1] << endl;
    else
        cout << str << endl;
}
```

Task 4

Write a program that will take positive integer values (Between 1 and 9) as input and store them in an array. It will stop taking input for any negative number or zero.
Now the program will print how many times each input number occurs.
(Don't show anything for the number that didn't occur.)

Sample Input:	Sample Output:
3 4 5 7 8 9 1 3 3 4 4 5 6 0	3 occurs: 3 time(s) 4 occurs: 3 time(s) 5 occurs: 2 time(s) 1 occurs: 1 time(s) 7 occurs: 1 time(s) 8 occurs: 1 time(s) 9 occurs: 1 time(s)

Sample Solution:

```cpp
#include <iostream>
using namespace std;

int main()
{
    int arr[9] = {0};
    while (1){
        int n;
        cin >> n;
        if (n <= 0) break;
        else arr[n - 1]++;
    }
    for (int i = 0; i < 9; i++){
        if (arr[i] > 0)
            cout << i + 1 << " occurs: " << arr[i] << " time(s)" << endl;
    }
}
```