School Of Mechanical & Manufacturing Engineering, NUST

Department of Mechanical Engineering

CS-114 - Fundamental of Programing

ASSIGNMENT-1

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DATE:

20 November 2023

TASK 1:

1. Write a C++ program to display factors of a number using for loops.

Code:

```cpp
#include <iostream>

using namespace std;
int main()
{
//  TASK 1
    int num;
    cout<<"Please enter the number"<<endl;
    cin>>num;
    cout<<"The factors are: ";
    for(int f=1; f<=num; f+=1){
//      to put a full stop at the end instead of a comma
        if(f==num){cout<<f<<"."; break;}
        if(num%f == 0){cout<<f<<", ";}
    }
    return 0;
}
```

Result:

```
Please enter the number
56
The factors are: 1, 2, 4, 7, 8, 14, 28, 56.
--------------------------------
Process exited after 0.6743 seconds with return value 0
Press any key to continue . . .
```

TASK 2:

2. Write output to the following code.

```
#include <iostream>

int main() {
   int x = 5;
   int y = 10;

   if (x == 5)
      if (y == 10)
         std::cout << "x is 5 and y is 10" << std::endl;
   else
      std::cout << "x is not 5" << std::endl;

   return 0;
}
```

OUTPUT:

x is 5 and y is 10

TASK 3:

3. Write a C++ program, take an integer value from user and check if it's greater than 10 and less than equal to 20. Print 1 if yes and print 0 if no. Use appropriate datatype for output.

Code:

```
#include <iostream>

using namespace std;
int main()
{
//  TASK 3
    int x;
    cout<<"Please enter the number"<<endl;
    cin>>x;
    if(x>10 && x<20){cout<<1<<endl;}
    else{cout<<0<<endl;}

    return 0;
}
```

Result:

```
Please enter the number
13
1

--------------------------------
Process exited after 1.981 seconds with return value 0
Press any key to continue . . .
```

TASK 4:

4. Write a C++ program that uses a while loop to find the largest prime number less than a given positive integer N. Your program should take the value of N as input from the user and then find the largest prime number less than or equal to N. You are not allowed to use any library or pre-existing functions to check for prime numbers.

Code:

```cpp
#include <iostream>

using namespace std;
int main()
{
//  TASK 4
    int n;
    int prime;
    cout<<"Please enter the number"<<endl;
    cin>>n;
    for(int i=n; i>=2; i-=1){
        for(int j=2; j<=i; j+=1){
            if(i%j==0 && i==j){prime = j;}
            if(i%j==0){break;}
            }
        if(prime == i){break;}
        }
    cout<<"The largest prime less than "<<n<<" is: "<<prime<<endl;

    return 0;
}
```

Result:

```
Please enter the number
56
The largest prime less than 56 is: 53

--------------------------------
Process exited after 0.8846 seconds with return value 0
Press any key to continue . . .
```

TASK 5:

5. Write a C++ program, take two string as input from user and check if both strings are equal or not. If they are equal make them unequal by rotating string. e.g., Hello is turned into olleH etc.

Code:

```
#include <iostream>
#include <cstring>

using namespace std;
int main()
{
//  TASK 5
    char st1[10];
    char st2[10];

    cout<<"Please enter the strings"<<endl;
    cin>>st1;
    cin>>st2;
    int p = strlen(st2)-1;
    char st3[p];
    if(strcmp(st1, st2)==0){
        for(int i=0; i<10; i+=1){
            st3[p]=st2[i];
            p=p-1;}
        cout<<"The reversed string is: "<<st3<<endl;}
    else{cout<<"the strings are not the same"<<endl;}

    return 0;
}
```

Result:

```
Please enter the strings
burger
burger
The reversed string is: regrub

--------------------------------
Process exited after 3.302 seconds with return value 0
Press any key to continue . . .
```

TASK 6:

6. Perform division in C++ without / using for loops. You can use / only to display the final results. Your dividend must be greater than divisor.

Code:

```cpp
#include <iostream>

using namespace std;
int main()
{
//  TASK 6
    int dd;
    int dv;
    int q;
    int rem;
    int dd2;
    cout<<"a and b in a/b?? (a must be greater than b)"<<endl;
    cin>>dd>>dv;
    if(dv>dd){cout<<"Please follow the provided guideline.";}
    else{
        for(int i=0; i<=dd; i+=1)
            if((dd-i)%dv==0){rem=i; dd2=dd-i; break;}
        for(int j=0; j<=dd2; j+=1)
            if(j*dv == dd2){q=j; break;}
            cout<<"The quotient is "<<q<<endl;
            cout<<"The remainder is "<<rem<<endl;
    }

    return 0;
}
```

Result:

```
a and b in a/b?? (a must be greater than b)
100
13
The quotient is 7
The remainder is 9

--------------------------------
Process exited after 7.041 seconds with return value 0
Press any key to continue . . .
```

TASK 7:

7. Write a C++program for a string which may contain lowercase and uppercase characters. The task is to remove all duplicate characters from the string and find the resultant string.

Code:

```
#include <iostream>
#include <cstring>

using namespace std;
int main()
{
//  TASK 7
    int ls;
    cout<<"Enter the length of the string: "<<endl;
    cin>>ls;
    char str[ls];
    cout<<"Enter the string"<<endl;
    cin>>str;
    for(int i=0; i<=ls; i+=1){
        if(str[i]==str[ls-i]){str[ls-i] = ' ';}
    }
    for(int j=0; j<=ls; j+=1){
        if(str[j]==' '){str[j]=str[j+1]; str[j+1]=' ';}
    }
    cout<<"The resultant string is: "<<str;


    return 0;
}
```

Result:

```
Enter the length of the string:
6
Enter the string
paneer
The resultant string is: paner
--------------------------------
Process exited after 2.192 seconds with return value 0
Press any key to continue . . .
```

TASK 8:

8. Suppose an integer array a[5] = {1,2,3,4,5}. Add more elements to it and display them in C++.

Code:

```cpp
#include <iostream>

using namespace std;
int main()
{

//  TASK 8
    int l;
    cout<<"How many more elements do you want to add?"<<endl;
    cin>>l;
    int a[5+l] = {1,2,3,4,5};
    cout<<"Input the elements: "<<endl;
    for(int i=5; i<5+l; i+=1){
        cin>>a[i];}
    cout<<"{";
    for(int j=0; j<5+l; j+=1){
//      to prevent adding a comma after final term
        if(j==4+l){cout<<a[j]; break;}
        cout<<a[j]<<", ";}
    cout<<"}";


    return 0;
}
```

Result:

```
How many more elements do you want to add?
4
Input the elements:
2
4
6
8
{1, 2, 3, 4, 5, 2, 4, 6, 8}
--------------------------------
Process exited after 2.946 seconds with return value 0
Press any key to continue . . .
```

TASK 9:

9. Given an integer array and an integer X. Find if there's a triplet in the array which sums up to the given integer X.

Code:

```
#include <iostream>

using namespace std;
int main()
{
//  TASK 9
    int trip[3] = {0,0,0};
    int x;
    int l;
    cout<<"Please enter the integer"<<endl;
    cin>>x;
    cout<<"How many integers are to be tested?"<<endl;
//  length of string
    cin>>l;
    int string[l];
    cout<<"Input the elements: "<<endl;
    for(int i=0; i<l; i+=1){
    cin>>string[i];}
    for(int i=0; i<l; i+=1){
        for(int j=0; j<x; j+=1){
//  to prevent duplicate numbers
            if(j==i){continue;}
            if(j==trip[2]){continue;}
            for(int k=0; k<x; k+=1){
//  to prevent duplicate numbers
                if(k==j){continue;}
                if(k==i){continue;}
                if(string[i] + string[j] + string[k] == x){
                trip[0]=string[i];
                trip[1]=string[j];
                trip[2]=string[k];
                break;}
            }
        }
    }
//  testing if the triplet is unchanged
    if(trip[1]==0&&trip[2]==0&&trip[3]==0){cout<<"There is no triplet in the given array that adds up to "<<x<<endl;}
    else{
        cout<<"The found triplet is: {";
        for(int j=0; j<3; j+=1){
            cout<<trip[j]<<' ';}
            cout<<"}";
    }
    return 0;
}
```

Result:

```
Please enter the integer
15
How many integers are to be tested?
5
Input the elements:
7
6
0
19
2
The found triplet is: {2 7 6 }
--------------------------------
Process exited after 10.26 seconds with return value 0
Press any key to continue . . .
```

```
Please enter the integer
15
How many integers are to be tested?
5
Input the elements:
19
3
4
13
15
There is no triplet in the given array that adds up to 15

--------------------------------
Process exited after 7.104 seconds with return value 0
Press any key to continue . . .
```

TASK 10:

10. Implement Bubble Sort on an array of 6 integers.

Code:

```
#include <iostream>

using namespace std;
int main()
{
//  TASK 10
    int a[6];
    int bub[6];
    int p = 5;
    cout<<"Input the elements: "<<endl;
    for(int i=0; i<6; i+=1){
    cin>>a[i];}
    cout<<"The given array is: {";
    for(int c=0; c<6; c+=1){
        cout<<a[c]<<' ';}
    cout<<"}, ";
    for(int z=0; z<6; z+=1){
        for(int j=0; j<6; j+=1){
                if(a[j]>=a[0] && a[j]>=a[1] && a[j]>=a[2] && a[j]>=a[3] && a[j]>=a[4] && a[j]>=a[5]){
            bub[p]=a[j]; a[j]=0; p=p-1;}
        else{continue;}
        if(a[0]==0 && a[1]==0 && a[2]==0 && a[3]==0 && a[4]==0 && a[5]==0){break;}
        }
    }
    cout<<"The bubble sorted array is: {";
    for(int b=0; b<6; b+=1){
        cout<<bub[b]<<' ';}
    cout<<"}";

    return 0;
}
```

Result:

```
Input the elements:
7
13
2
100
19
8
The given array is: {7 13 2 100 19 8 }, The bubble sorted array is: {2 7 8 13 19 100 }
--------------------------------
Process exited after 6.629 seconds with return value 0
Press any key to continue . . .
```