Department of Computer Science

CS101 – Introduction To Computing

Final (Fall 2016)

Course Instructors
Rizwan Ul Haq, Rana Asif Rehman, Zain Iqbal
December 23, 2016

Total Marks: 90	**Time Allowed: 180 Minutes**

Instructions:

(1) Understanding the question is part of exam. NO QUERIES WILL BE ENTERTAINED.
(2) The paper consists of ONE (Subjective) part.
(3) Provide answers in the given space.
(4) Write neat and clean answers.
(5) Calculators are not allowed
(6) Use permanent ink pens only.
(7) In case of ambiguity, ZERO points will be assigned to the respective question(s).
(8) You are not allowed to use any built-in function unless specified explicitly.
(9) Use the constructs ONLY which we have studied in the class.
(10) Question No: 8 should be attempted by Section R only.
(11) Question No: 6 should be attempted by Section A, B, C, D, E, F only.

Roll No: ________________ **Section:** ____________

Question	1	2	3	4	5	6	7	8	Total
Points	10	10	10	15	10	15	10	10	90
Score									

Question:1	**10 Marks**

Write a function that will take an array of integers and will square the value at even index and cube the values at odd index. ***[Your program should work for every input rather than the following example]***

For example

Array passed to the function contains:

2	5	3	9	5	10	6

Output of the function will be:

4	125	9	729	25	1000	36

<Your Code>

```
void func(int array[], int size)
{
	for ( int i=0 ; i<size ; i++)
	{
		if( i%2 == 0)
			array[i] = array[i] * array[i];
		else
			array[i] = array[i] * array[i] * array[i];
	}
}
```

Question:2	**10 Marks**

Write a function that takes two arrays as parameter, in which first array is one dimensional with n*n elements and the second is two dimensional array of size n*n. The function will copy the elements of fist array into the second array. Sizes of arrays will be passed as a parameter to the function ***[Hint: Use the modulus operator intelligently]***

For Example:

array1 [4] = {1, 2, 3, 4}

After the execution of the function array1 elements will be copied into the array2 such that

array2[0][0] = 1, array2[0][2] = 2, array2[1][0] = 3, array2[1][1] = 4.

<Your Code>

```
void func(int array1[], int array2[][n], int size)
{
     for( int i=0 ; i<SIZE ; i++)
     {
          array2[i/n][i%n] = array1[i];
     }
}
```

Question:3	**10 Marks**

Write down a code that will print a hollow square. The program will have a function **getSide** that will get the size of one side of square from user and return that. Then this size will be passed to a function **printSquare** that will print the square on the screen. For Example:

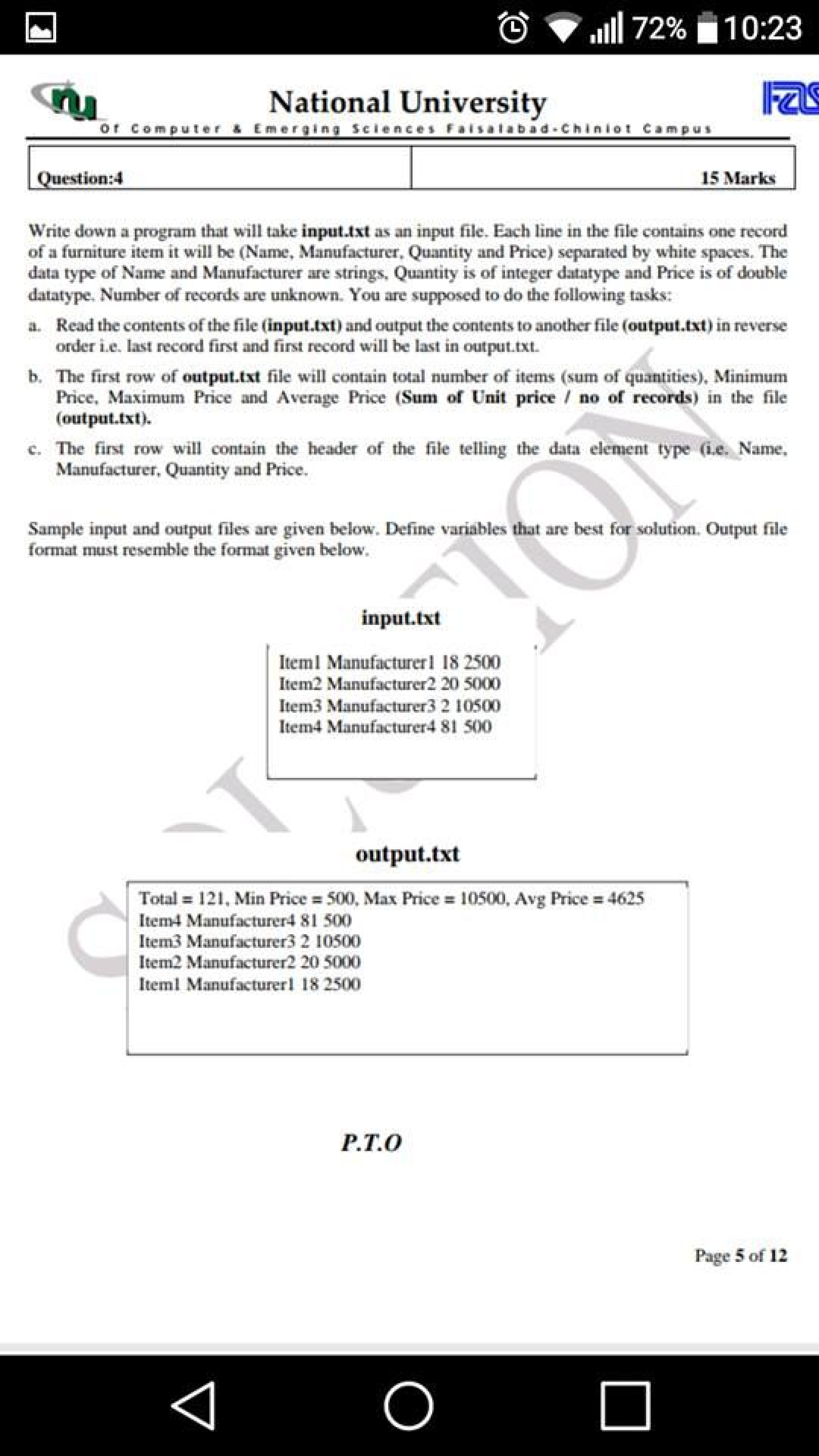
Input Size: 5

Output:

```
* * * * *
*       *
*       *
*       *
* * * * *
```

<Your Code>

```
int getSide()
{
    int side;
    cout << "Input the side of the square : " ;
    cin >> side;
    return side;
}
void printSquare(int size)
{
    int i = 0;
    for( i =0 ; i < size ; i++)
    {
        if( i==0 || i==size-1)
            for(int j=0; j<size; j++)
                cout << '*' ;
        else
            for(int j=0 ; j<size ; j++)
                if(j==0 || j==size-1)
                    cout << '*' ;
                else
                    cout << ' ' ;
        cout << endl;
    }
}
```



Question:4	**15 Marks**

Write down a program that will take **input.txt** as an input file. Each line in the file contains one record of a furniture item it will be (Name, Manufacturer, Quantity and Price) separated by white spaces. The data type of Name and Manufacturer are strings, Quantity is of integer datatype and Price is of double datatype. Number of records are unknown. You are supposed to do the following tasks:

a. Read the contents of the file **(input.txt)** and output the contents to another file **(output.txt)** in reverse order i.e. last record first and first record will be last in output.txt.

b. The first row of **output.txt** file will contain total number of items (sum of quantities), Minimum Price, Maximum Price and Average Price **(Sum of Unit price / no of records)** in the file **(output.txt).**

c. The first row will contain the header of the file telling the data element type (i.e. Name, Manufacturer, Quantity and Price.

Sample input and output files are given below. Define variables that are best for solution. Output file format must resemble the format given below.

input.txt

```
Item1 Manufacturer1 18 2500
Item2 Manufacturer2 20 5000
Item3 Manufacturer3 2 10500
Item4 Manufacturer4 81 500
```

output.txt

```
Total = 121, Min Price = 500, Max Price = 10500, Avg Price = 4625
Item4 Manufacturer4 81 500
Item3 Manufacturer3 2 10500
Item2 Manufacturer2 20 5000
Item1 Manufacturer1 18 2500
```

P.T.O

<Your Code>

```
const int SIZE = 500;
int main()
{
    ofstream outfile("output.txt");
    ifstream infile("input.txt");
    string name[SIZE], man[SIZE];
    int qty[SIZE], count = 0;
    double price[SIZE], minP = 0, maxP = 0, avgP = 0, sumP = 0;
    infile >> name[count] >> man[count] >> qty[count] >> price[count] ;
    minP=price[count];
    maxP=price[count];
    sumP += price[count];
    count++;
    while(!infile.eof())
    {
           infile >> name[count] >> man[count]
                  >> qty[count] >> price[count] ;
           if(infile.eof())
               break;
           if(price[count] < minP)
               minP = price[count];
           if(price[count] > maxP)
               maxP = price[count];
           sumP = sumP + price[count];
           count++;
    }
    avgP = sumP / count;
    outfile << "Total = " << count << ", Min Price = "
            << minP << ", Max Price = " << maxP
            << ", Avg Price = " << avgP << endl;
    for(int i=count-1; i>=0 ; i--)
    {
            outfile << name[i] << " " << man[i] << " "
                      << qty[i] << " " << price[i] << endl;
    }
    infile.close();
    outfile.close();
}
```

Question:5	**10 Marks**

Consider two one-dimensional integer arrays A & B of some constant sizes: size1 & size2 respectively (both are initialized with some value). Now create an array C which will contain the elements by the intersection of A & B. Create another array D which will contain the elements by the union of A & B. You should decide the sizes of C & D arrays. Display the contents of both C & D.

For example: if A={5,15,32,69} and B={7,69} then your programs output should be:

C={69}
D={5,15,32,7,69}

```
const int SIZE1=5,SIZE2=8;

int A[SIZE1] = {10,16,12,8,50};
int B[SIZE2] = {1,2,5,10,9,16,50,25};
int C[SIZE1+SIZE2] = {0};
int D[SIZE1+SIZE2] = {0};
bool found = 0;
int intCount=0, unionCount=0;

//Code for Intersection of two sets
for(int i=0 ; i<SIZE1 ; i++)
{
        for(int j=0 ; j<SIZE2 ; j++)
        {
                if( A[i] == B[j])
                {
                        C[intCount] = A[i];
                        intCount++;
                }
        }
}
//Code for Union of two sets
for(int i=0 ; i<SIZE1 ; i++)
        D[unionCount++] = A[i];
        for(int i=0; i<SIZE2 ; i++)
        {
                for(int j=0 ; j<SIZE1 ; j++)
                {
                        if(B[i] == A[j])
                        {
                                found = true ;
                                break;
                        }
                }
                if(!found)
                        D[unionCount++] = B[i];
                found = false;
        }
//Code to Display C and D
        for(i=0 ; i< intCount ; i++)
                cout << C[i] << " " ;
        for(i=0 ; i< unionCount ; i++)
                cout << D[i] << " " ;
```

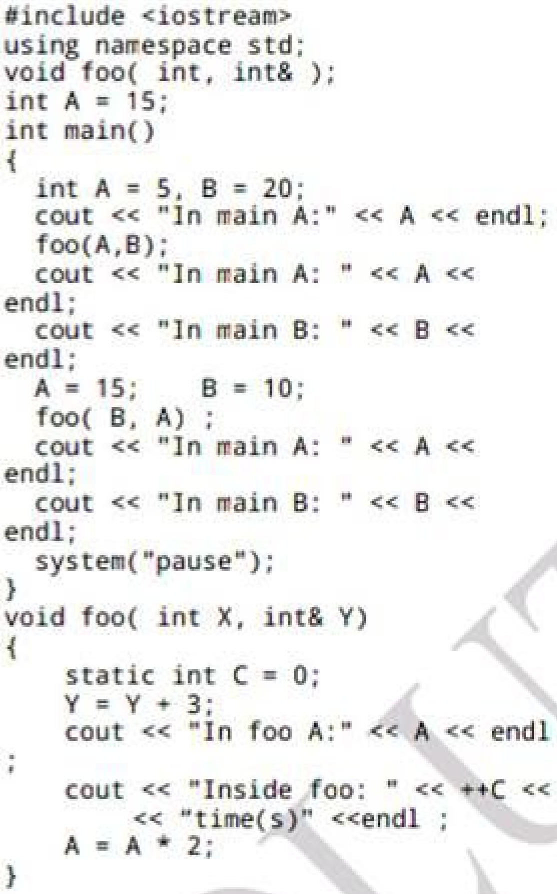
[The Following Question is Only FOR Section A, B, C,D,E,F]

Question:6	**08 (01)+07=15 Marks**

a) Examine the C++ program below, and answer the questions about that program in the blanks provided. No points will be given for overwriting and/or cutting.

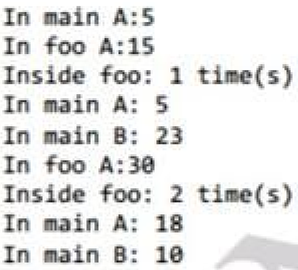
```
#include <iostream>
using namespace std;
int f( int, int&, int& );
void main()
{
  int A = 5,    B = 20,    C = 15;
  cout << endl << f( A, B, C ) << endl;               // Value of f: _____31____

  cout << "Value of A: " << A << endl;                // Value of A: _____5______

  cout << "Value of B: " << B << endl;                // Value of B: _____13_____

  cout << "Value of C: " << C << endl;                // Value of C: ______3_____
  A = 15;    B = 10;    C = 5;
  cout << endl << f( A, B, C ) << endl;               // Value of f: _____23_____

  cout << "Value of A: " << A << endl;                // Value of A: ______15____

  cout << "Value of B: " << B << endl;                // Value of B: ______3_____

  cout << "Value of C: " << C << endl;                // Value of C: _____5______


}
int f( int X, int& Y, int& Z )
{
  if (X<10)
  {
    X = X + 10;
  }
  Y = Y - X / 2;
  if (Y > 8)
  {
    Z = Z - 12;
  }
  return X+Y+Z;
}
```

h) Show the output of the program



```
#include <iostream>
using namespace std;
void foo( int, int& );
int A = 15;
int main()
{
  int A = 5, B = 20;
  cout << "In main A:" << A << endl;
  foo(A,B);
  cout << "In main A: " << A <<
endl;
  cout << "In main B: " << B <<
endl;
  A = 15;    B = 10;
  foo( B, A) ;
  cout << "In main A: " << A <<
endl;
  cout << "In main B: " << B <<
endl;
  system("pause");
}
void foo( int X, int& Y)
{
    static int C = 0;
    Y = Y + 3;
    cout << "In foo A:" << A << endl
;
    cout << "Inside foo: " << ++C <<
         << "time(s)" <<endl ;
    A = A * 2;
}
```

<OUTPUT>



```
In main A:5
In foo A:15
Inside foo: 1 time(s)
In main A: 5
In main B: 23
In foo A:30
Inside foo: 2 time(s)
In main A: 18
In main B: 10
```

Question:7	**10 Marks**

Write a function called *delete_repeats* that has a partially filled array of characters and that deletes all repeated letters from the array. When a letter is deleted, the remaining letters are moved forward to fill in the gap. This will create empty positions at the end of the array so that less of the array is used. You have to show elements of array and also mention the number of filled indexes. Be very careful about the parameter passing and use most suitable methods.

<Your Code>

```
void delete_repeats(char array[], int& filled)
{
	int validindex = 0;
	for(int i=0 ; i<size ; i++)
	{
		validindex = i;
		for(int j=i+1 ; j< filled; j++)
		{
			if(array[i] != array[j])
			{
				array[++validindex] = array[j] ;
			}
		}
		filled = validindex + 1 ;
	}
	array[filled] = ‘\0’;
	cout << array << “ ” << filled << endl;
}
```

[The Following Question is Only FOR Section R]

Question:8	**10 Marks**

What will be the output of the Following programs?

a)

```
   void fun(void *p);
int i;

int main()
{
   void *vptr;
   vptr = &i;
   fun(vptr);
   return 0;
}
void fun(void *p)
{
   int **q;
   q = (int**)&p;
   cout<< **q;
}
```

<<Output>>

b)

```
   int *check(static int, static int);

      int main()
      {
         int *c;
         c = check(10, 20);
         cout<<c;
         return 0;
      }
      int *check(static int i, static int j)
      {
         int *p, *q;
         p = &i;
         q = &j;
         if(i >= 45)
            return (p);
         else
            return (q);
}
```

<<Output>>

P.T.O

c)

```
    int main(){
char *ptr1 = NULL;
char *ptr2 = 0;
strcpy(ptr1," c");
strcpy(ptr2,"questions");
cout<<ptr1<<ptr2;
return 0;
}
```

<<Output>>

d)

```
    int main(){
int i = 3;
int *j;
int **k;
j = &i;
k = &j;
cout<<i<<j<<k;
return 0;
}
```

<<Output>>

e)

```
#include <iostream>
void friendly( );
void shy(int audience_count);
int main( )
{
using namespace std;
friendly( );
shy(6);
cout << "One more time:\n";
shy(2);
friendly( );
cout << "End of program.\n";
return 0;
}
void friendly( )
{
using namespace std;
cout << "Hello\n";
}
void shy(int audience_count)
{
using namespace std;
if (audience_count < 5)
return;
cout << "Goodbye\n";
}
```

<<Output>>