Computer Programming (b) - E1124

(Spring 2021-2022)

Lecture 6

Revision

INSTRUCTOR

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Contents

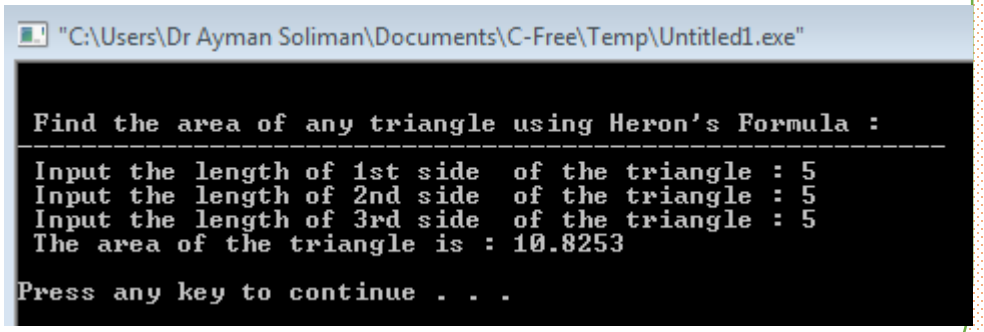
- Find the area of any triangle using heron's formula.
- Swap the values of two variables not using third varia
- Swap first and last digits of any number.
- Add two matrix using multi-dimensional arrays
- Swap two elements using pointer and functions.
- Search any element using sequential search
- Search any element using binary search
- Search any element using jump search
- Sort any array using bubble sort

➢ Ex1 - Write a program in C++ to find the area of any triangle using Heron's Formula.

$$area = \sqrt{s\,(s-a)(s-b)(s-c)}$$

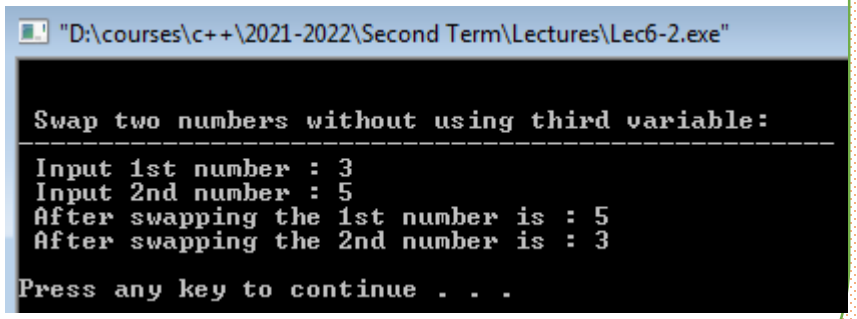
$$s = \frac{a+b+c}{2}$$

```
#include <iostream>
#include <math.h>
using namespace std;
   int main()
   {        float side1, side2, side3, area, s;
                    cout << "\n\n Find the area of any triangle using Heron's Formula :\n";
                    cout << "-----------------------------------------------------\n";
      cout<<" Input the length of 1st side  of the triangle : ";
            cin>>side1;
      cout<<" Input the length of 2nd side  of the triangle : ";
            cin>>side2;
      cout<<" Input the length of 3rd side  of the triangle : ";
            cin>>side3;
                    s = (side1+side2+side3)/2;
                    area = sqrt(s*(s-side1)*(s-side2)*(s-side3));
      cout<<" The area of the triangle is : "<< area << endl;
      return 0;
   }
```



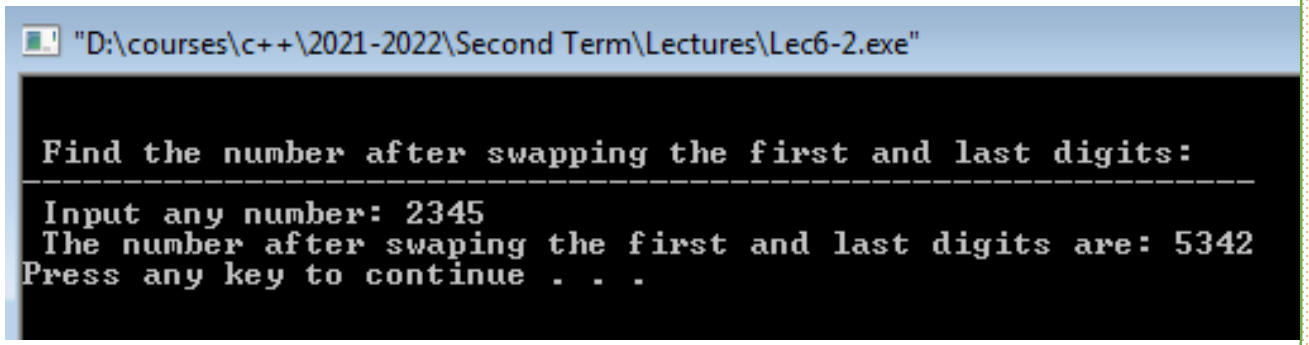
➢ Ex2 - Write a program in C++ which swap the values of two variables not using third variable.

```
#include <iostream>
using namespace std;
 int main()
{
            cout << "\n\n Swap two numbers without using third variable:\n";
            cout << "-----------------------------------------------\n";
            int num1, num2, temp;
            cout << " Input 1st number : ";
            cin >> num1 ;
            cout << " Input 2nd number : ";
            cin >> num2;
            num2=num2+num1;
            num1=num2-num1;
            num2=num2-num1;
   cout << " After swapping the 1st number is : "<< num1 <<"\n" ;
   cout << " After swapping the 2nd number is : "<< num2 <<"\n\n" ;
}
```



➢ Ex3 - Write a C++ program to swap first and last digits of any number.

```
#include <iostream>
#include <math.h>
using namespace std;
int main()
{
   int n, first, last, sum, digits, nn, a, b;
   cout << "\n\n Find the number after swapping the first and last digits:\n";
   cout << "-------------------------------------------------------\n";
   cout << " Input any number: ";
   cin >> n;
   digits = log10(n);
   first = n / pow(10, digits);
   last = n % 10;
   a = first * (pow(10, digits));
   b = n % a;
   n = b / 10;
   nn = last * (pow(10, digits)) + (n * 10 + first);
   cout << " The number after swaping the first and last digits are: " << nn << endl;
}
```



➢ Ex4 - Write a C++ Program to Add Two Matrix Using Multi-dimensional Arrays

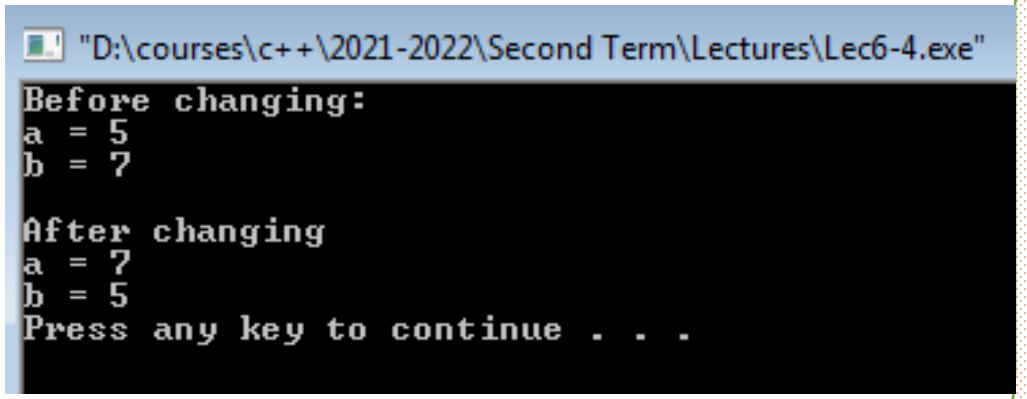
```
#include <iostream>
using namespace std;
int main()
{   int r, c, a[100][100], b[100][100], sum[100][100], i, j;
   cout << "Enter number of rows (between 1 and 100): ";
   cin >> r;
   cout << "Enter number of columns (between 1 and 100): ";
   cin >> c;
   cout << endl << "Enter elements of 1st matrix: " << endl;
   // Storing elements of first matrix entered by user.
   for(i = 0; i < r; ++i)
     for(j = 0; j < c; ++j)
     {  cout << "Enter element a" << i + 1 << j + 1 << " : ";
        cin >> a[i][j]; }
   // Storing elements of second matrix entered by user.
   cout << endl << "Enter elements of 2nd matrix: " << endl;
   for(i = 0; i < r; ++i)
     for(j = 0; j < c; ++j)
     {  cout << "Enter element b" << i + 1 << j + 1 << " : ";
        cin >> b[i][j];
     }
```

```
// Adding Two matrices
   for(i = 0; i < r; ++i)
      for(j = 0; j < c; ++j)
         sum[i][j] = a[i][j] + b[i][j];
   // Displaying the resultant sum matrix.
   cout << endl << "Sum of two matrix is: " << endl;
   for(i = 0; i < r; ++i)
      for(j = 0; j < c; ++j)
      {   cout << sum[i][j] << "  ";
          if(j == c - 1)
             cout << endl; }
   return 0; }
```

```
"D:\courses\c++\2021-2022\Second Term\Lectures\Lec6-2.exe"
Enter number of rows (between 1 and 100): 2
Enter number of columns (between 1 and 100): 2

Enter elements of 1st matrix:
Enter element a11 : 1
Enter element a12 : 2
Enter element a21 : 3
Enter element a22 : 4

Enter elements of 2nd matrix:
Enter element b11 : 1
Enter element b12 : 2
Enter element b21 : 3
Enter element b22 : 4

Sum of two matrix is:
2  4
6  8
Press any key to continue . . .
```

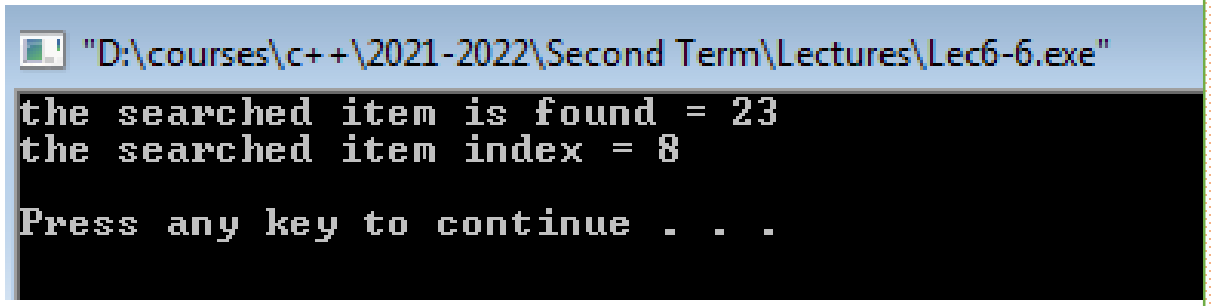
➢ Ex5 - Write a program to swap two elements using pointer and functions.

```
#include <iostream>
using namespace std;
int a = 5, b = 7;
void test(int* n1, int* n2)
        {       int c=a;
                *n1 = b;
                *n2 = c;
        }
        int main() {
        cout << "Before changing:" << endl;
        cout << "a = " << a << endl;
        cout << "b = " << b << endl;
        test(&a, &b);

        cout << "\nAfter changing" << endl;
        cout << "a = " << a << endl;
        cout << "b = " << b << endl;
        return 0;
}
```



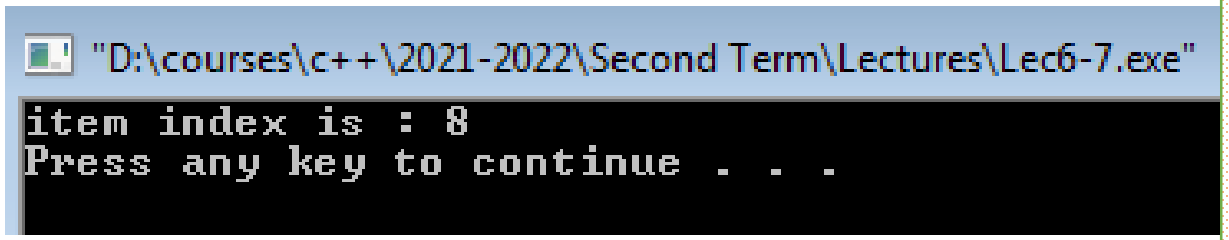
➢ Ex6 - Write a program in C++ to search any element using sequential search

```
#include <iostream>
using namespace std;
int seqsearch(int array[],int n,int y)
{bool a=false;
        for(int x=0; x<n; x++)
        if (array[x]==y)
        {
                cout<<"the searched item is found = "<<y<<endl;
                cout<<"the searched item index = "<<x<<endl;
                a=true;
        }
        if(!a)
           cout<<"the searched item is not found"<<endl;
           }
int main()
{
        int array[]={1,3,5,7,9,11,16,19,23,25};
        int n=sizeof(array)/sizeof(array[0]);
        seqsearch(array,n,23);
        cout<<endl;
        return 0;
}
```



➢ Ex7 - Write a program in C++ to search any element using sequential search

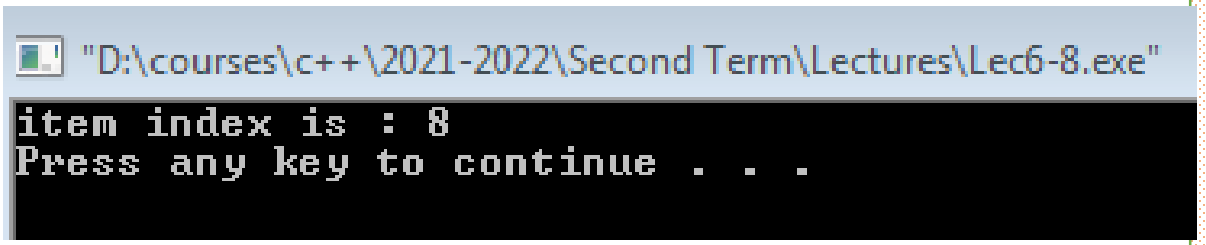
```
#include <iostream>
using namespace std;
int seqsearch(int array[],int n,int y)
{
        for(int x=0; x<n; x++)
        if (array[x]==y)
        return x;
        return -1;
}

int main()
{
        int array[]={1,3,5,7,9,11,16,19,23,25};
        int n=sizeof(array)/sizeof(array[0]);
        cout<<"item index is : "<<seqsearch(array,n,23)<<endl;
        return 0;
}
```



➢ Ex8 - Write a program in C++ to search any element using binary search

```
#include <iostream>
using namespace std;
int binsearch(int array[],int n,int y)
{
        int first =0;
        int last = n-1;
        int mid;
        bool found = false;
        while (first<=last && !found)
        {
                mid = (first + last) / 2;
                if ( array[mid] == y)
                found = true;
                else if ( array[mid] > y)
                last = mid - 1;
                else
                first = mid + 1;
        }
        if (found)
                return mid;
        else
                return -1;
}
```

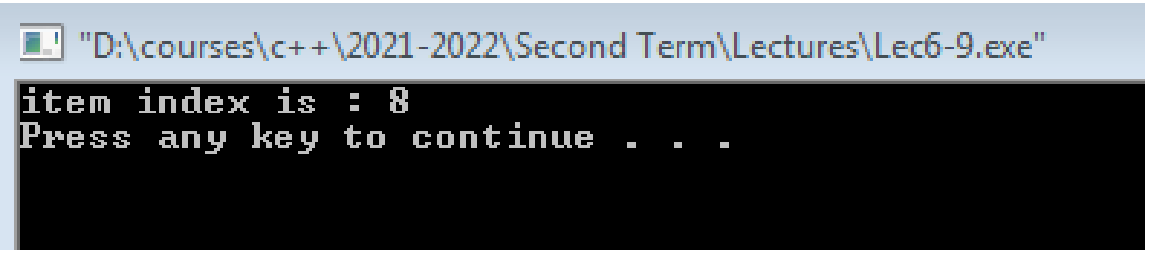
```
int main()
{
        int array[]={1,3,5,7,9,11,16,19,23,25};
        int n=sizeof(array)/sizeof(array[0]);
        cout<<"item index is :
"<<binsearch(array,n,23)<<endl;
        return 0;
}
```



➢ Ex9 - Write a program in C++ to search any element using jump search

```
#include <iostream>
#include <cmath>
using namespace std;
int jumpsearch(int array[],int n,int x)
{
        int l=0, r=sqrt(n), m=sqrt(n);
                while (array[r]<=x && r<n)
        {
                l=r;
                r=r+m;
                if ( r > n-1)
                r=n; }
                for (int i=l; i<r; i++)
                if (array[i]==x)
                return i;
                return -1;
}
```

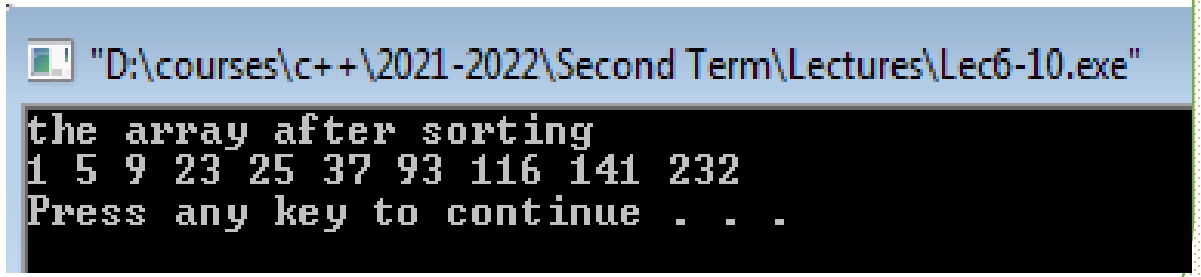
```
int main()
{
        int array[]={1,3,5,7,9,11,16,19,23,25};
        int n=sizeof(array)/sizeof(array[0]);
        cout<<"item index is :
"<<jumpsearch(array,n,23)<<endl;
        return 0;
}
```



➢ Ex10 - Write a program in C++ to sort any array using bubble sort

```
#include <iostream>
using namespace std;
int bubblesort(int array[],int n)
{
        int temp, iteration, i;
        for (iteration = 1; iteration < n; iteration++)
        {
                for ( i = 0; i < n - iteration; i++)
                if ( array[i] > array[i+1])
                {
                        temp = array[i];
                        array[i] = array[i+1];
                        array[i+1] = temp;
                }
        }
}
```

```
int main()
{
        int array[]={1,23,5,37,9,141,116,93,232,25};
        int n=sizeof(array)/sizeof(array[0]);
        bubblesort(array,n);
        cout<<"the array after sorting "<<endl;
        for(int i=0; i<n; i++)
        cout<<array[i]<<" ";
        cout<<endl;
        return 0;
}
```



Thank you