

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**  
**Information and Computer Science Department**  
**ICS202: Data Structures**  
**HOMEWORK 2 (Term 071)**  
**Due Date: Monday, October 22<sup>nd</sup>, 2007**

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**Question # 1: (15 points)**

Look at the following code, and then answer the questions afterwards.

```
public static void Mirror(int array[]){
    for(int i = 0; i <array.length/2; i++){
        {
            swap(array,i,array.length-1-i);
        }
    }
}

public static void swap(int arr[],int x, int y){
    int temp = arr[x];
    arr[x]    = arr[y];
    arr[y] = temp;
}
```

- a) Find the complexity of the **Mirror** method in terms of the number of basic operations required to execute the method. Your answer should be a function of **n** i.e., **f(n)**.
- b) Find the tight Big-O complexity **g(n)** for the function **f(n)**.
- c) Prove that **f(n) = O(g(n))** for the two functions determined above, by finding a pair of suitable values for **c** and **n<sub>0</sub>**, such that for all **n > n<sub>0</sub>**, **f(n) <= c \* g(n)**.

**Question # 2: (10 points)**

Consider the code provided for DoublyLinkedList and implement a method called

**Object Search(Object target)**

That will return the Object in the linked list that matches with the **target** passed into the function. The function should return null if **target** is not found.

**Question # 3: (25 points)**

- a. Write a class as described below  
public class flight implements Comparable

```

    {
        private String From;
        private String To;
        private int Seats;
        private String Day;
    }

```

The *compareTo* method with the following header:

```
public int compareTo(Object obj)
```

that does the comparison based on **From, To and Day fields** of the Flight class.

- b. Write a program called Airlines that maintains a list (Double Linked List) of flight objects. Your Airline program should be menu driven as described below

```

*****
*   1. Add a new flight to Airlines           *
*   2. Book a seat on a flight               *
*   3. Cancel a seat on a flight            *
*   4. Find Flights                         *
*   5. Print all flights on a day           *
*   6. Print all flights on a route         *
*   7. exit                                  *
*****

```

1. The first menu item should allow to user to enter a new flight. This flight object should be inserted in the linked list. The user should be allowed to specify the From, To, Day and Seats field of the new flight.
2. This option should allow to user to book a seat on a flight. The user will enter the To, From, and Day field of the flight. If there are no seats available on the flight, the user should be given an appropriate message.
3. This option will allow the user to cancel a seat flight. The user will enter the To, From, and Day field of the flight.
4. This option will allow the user to search for a flight on a specific route (To, From fields) and on a specific Day.
5. This option should allow the user to print all flights on a day entered by the user.
6. This option should allow the user to print all flights on a route entered by the user.
7. Use your imagination for this option.

### Important Notes:

- Your report for this homework must be **word-processed** and must follow the **homework submission template** format, which you can get in the downloadables section of the WebCT.
- All the classes for this homework must be stored in a package **ics202.hw02**.
- You must import the necessary packages needed for your program.
- You need to submit two things:

1. A printed copy of your report at the beginning of your class on the due date.
2. Submit your entire **ics202** package into the webCT under the Assignments option.