Çankaya University
Department of Computer Engineering
CENG 218 Data Structures
Midterm 1

Instructor: Abdulkadir GORUR

Time Allowed: 120 minutes Date: 25/07/ 2007

Name and Surname :……

Student Number :……

1. **(20p)** Write a function **isNotCovered** that takes Stack1 and Stack2 as parameters (containing the same type of elements) and returns TRUE if stack2 is Not contained in stack1 preserving the order. (20)

   For example, the following would return **FALSE** if passed as parameters to your method:

   Stack1: [6,**1, 3, 4**, 9, 5] top
   Stack2: [**1, 3, 4**] top

   The following parameters would return TRUE,

   Stack1: [1, 3, 4, 9, 5] top
   Stack2: [1, 4, 9] top

   - all valid operations for stack and queue are available
   - size of stacks are not known. (if you develop algorithm which will work only on given example the solution will not be accepted)

1. **(20p)** Given a Queue q, whose elements are in increasing order, write a function that returns the number of items occurring once in the queue. If the queue is

   q[front]12, 23, 23, 45, 67, 67, 67, 67, 82[rear], it should return 3.

2. **(25p)**Write a function called **generateString(s1,s2)** that thakes two strings as its arguments. The String s1 contains pairs of characters. A pair is defined as single digit numeric character followed by alpha/numeric character.
The function will fill s2 string by considering the content of s1. Following illustraes how **generateString** function generates s2 based on s1.(assume s1 is either empty or always contains pairs of characters)(20)
Ex2: s1="4a8e3z4b"
s2="aaaaeeeeeeeezzzbbb"
Ex3: s1="2a3l5i"
s2="aallliiiii"
Ex4: s1="263k5q"
s2="66kkkqqqqq"

2. Write a **function** with the signature removeRepeatedSequence(Queue *q) that will modify Queue contents by leaving single character for each repeated sequence of characters. Consider following example (**20**p)

q: Ddddddaaaaattttta Sttrructtuureesss

front
rear
After call to removeRepeatedSequence q becomes

q: Data Structures

front ***rear***

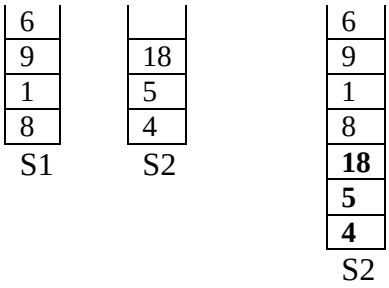
3. Write a short program that takes an integer value (call it n) from the user and prints out a square of numbers starting with 1 in the top left corner, 2 in a ring around the 1, 3 in a ring around the 2's, For example, if the user enters 3 as the input, your program should print out: (15p)

```
1 2 3
2 2 3
3 3 3
```

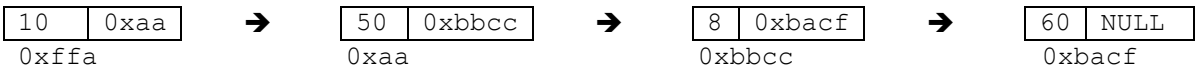
If the user enters 5 as the input, your program should print out:

```
1 2 3 4 5
2 2 3 4 5
3 3 3 4 5
4 4 4 4 5
5 5 5 5 5
```

4. Write a function called catStack, that concatenates the contents of frist stack on top of second.(**void catStack(Stack *s1,Stack *s2)**)(15p)



5. Write a function that swaps (exchanges) two nodes in a list. The nodes are identified by key values(int) that are passed as parameters together with the head node. (15p)



If we call the function with following arguments the linked list should become as follows
head=Swap(head,10,8);

5. **(15p)**Given a linked list l, whose elements(integer) are in increasing order, write a function that removes the non repeating numbers from list

1->12**->** 23**->** 23**->** 45**->** 67**->** 67**->** 67**->** 67**->** 82->NULL