1. Try exchanging LinkedList with ArrayList in StringListGenerator.java, how does this effect the runtime of SimpleDuplicateFinder.java when used to check the generated list for duplicates. Why?

2. Test the runtime of the three implementations of DuplicateFinder explained in class with 1000-10000 elements. Try formulating a hypothesis for how the runtime changes with increased problem size for each implementation. Do your tests confirm your hypothesis?

3. (1.3.3) Suppose that a client performs an intermixed sequence of (stack) *push* and *pop* operations. The push operations put he integers 0 through 9 in order onto the stack; the pop operations print out the return values. which of the following sequence(s) could *not* occur?

a. 4 3 2 1 0 9 8 7 6 5
b. 4 6 8 7 5 3 2 9 0 1
c. 2 5 6 7 4 8 9 3 1 0
d. 4 3 2 1 0 5 6 7 8 9
e. 1 2 3 4 5 6 9 8 7 0
f. 0 4 6 5 3 8 1 7 2 9
g. 1 4 7 9 8 6 5 3 0 2
h. 2 1 4 3 6 5 8 7 9 0

4. (1.3.13) Suppose that a client performs an intermixed sequence of (queue) *enqueue* and *dequeue* operations. The enqueue operations put he integers 0 through 9 in order onto the queue; the dequeue operations print out the return value. which of the following sequence(s) could *not* occur?

a. 0 1 2 3 4 5 6 7 8 9
b. 4 6 8 7 5 3 2 9 0 1
c. 2 5 6 7 4 8 9 3 1 0
d. 4 3 2 1 0 5 6 7 8 9

5. (1.3.44) *Text editor buffer.* Develop a data type for a buffer in a text editor that implements the following API:

```
public class Buffer
      Buffer()          create an empty Buffer
 void insert(char c)    insert c at the cursor position
 char get()             return character at cursor position
 char delete()          delete and return the character at the cursor
 void left()            move the cursor k positions to the left
 void right()           move the cursor k positions to the right
  int size()            number of characters in the buffer
```

Hint:

6. (1.3.37) Josephus problem In the josephus problem from antiquity, N people are in dire straits and agree to the following strategy to reduce the population. They arrange themselves in a circle (at positions numbered from 0 to N-1) and proceed around the circle, eliminating every Mth person until only one person is left. Legend has it that josephus figured out where to sit to avoid being eliminated. Write a Queue client `Josephus` takes M and N from the command line and prints out the order in which people are eliminated (and thus would show Josephus where to sit in the circle).

```
% java Josephus 2 7
1 3 5 0 4 2 6
```

7. Write a program that, given a list of N double values, finds a closest pair; two values whose difference is no smaller than the difference of any other pair(in absolute value). The running time of you programshould be linearithmic in the worst case. Use the attached interface and test, ClosestPair and ClosestPairTest.