CSE2211: OOP Java and Design Methods
Quiz 6: Arrays and Array Lists (28.11.2018)

1. Consider the following array:
```
int[] a = { 1, 2, 3, 4, 5, 4, 3, 2, 1, 0 };
```
What are the contents of the array **a** after the following loops complete?

a)
```
for(inti = 1; i< 10; i++) { a[i] = a[i - 1]; }
```
b)
```
for(inti = 9; i> 0; i--) { a[i] = a[i - 1]; }
```
c)
```
for(inti = 0; i< 9; i++) { a[i] = a[i + 1]; }
```
d)
```
for(inti = 8; i>= 0; i--) { a[i] = a[i + 1]; }
```
e)
```
for(inti = 1;i< 10; i++){a[i]=a[i] + a[i - 1]; }
```
f)
```
for(inti=1;i<10;i=i+2){a[i]=0;}
```
g)
```
for(inti = 0; i< 5; i++) { a[i + 5] = a[i]; }
```
h)
```
for(inti = 1; i< 5; i++) { a[i] = a[9 - i]; }
```

2. What is wrong with each of the following code segments?

a)
```
int[] values = new int[10];
for (inti = 1; i<= 10; i++) {
values[i] = i * i; }
```
b)
```
int[] values;
for (inti = 0; i<values.length; i++) {
values[i] = i * i; }
```

3. Rewrite the following loops using the enhanced for loop construct. Here, values is an array of floating-point numbers.

a)
```
for (inti = 0; i<values.length; i++) {
total = total + values[i]; }
```
b)
```
for (inti = 1; i<values.length; i++) {
total = total + values[i]; }
```
c)
```
for (inti = 0; i<values.length; i++) {
if (values[i] == target) { return i; } }
```

4. What is wrong with each of the following code segments?

a)
```
ArrayList<int> values = new ArrayList<int>();
```
b)
```
ArrayList<Integer> values = new ArrayList();
```
c)
```
ArrayList<Integer> values = new ArrayList<Integer>;
```
d)
```
ArrayList<Integer> values = new ArrayList<Integer>(); for (inti
= 1; i<= 10; i++){
values.set(i - 1, i * i); }
```
e)
```
ArrayList<Integer> values;
for (inti = 1; i<= 10; i++) {
values.add(i * i); }
```

5. Consider the following loop for collecting all elements that match a condition; in this case, that the element is larger than 100.
```
ArrayList<Double> matches = new ArrayList<Double>();
for (double element : values){
     if (element > 100) {
          matches.add(element);
     }
}
```
Trace the flow of the loop, where values contains the elements 110 90 100 120 80.
Show two columns, for element and matches.

6. What is wrong with the following method that aims to fill an array with random numbers?

```
public void makeCombination(int[] values, int n) {
   Random generator = new Random();
   int[] numbers = new int[values.length];
   for (inti = 0; i<numbers.length; i++) {
      numbers[i] = generator.nextInt(n);
   }
   values = numbers;
}
```

7. Howdoyou perform thefollowingtaskswitharray-listsinJava?
   a. Test that two array lists contain the same elements in the same order.
   b. Copy one array list to another.
   c. Fillanarray-listwithzeroes,overwritingallelementsinit.
   d. Remove all elements from an array list.

8. What does the array list names contain after the following statements?

```
ArrayList<String> names = new ArrayList<String>;
names.add("Bob");
names.add(0, "Ann");
names.remove(1);
names.add("Cal");
```

9. Consider this method that appends the elements of one array list to another:

```
public void append(ArrayList<String> target, ArrayList<String>
source) {
     for (inti = 0; i<source.size(); i++) {
          target.add(source.get(i));
     }
}
```

What are the contents of **names1** and **names2** after these statements?

```
ArrayList<String> names1 = new ArrayList<String>();
names1.add("Emily");
names1.add("Bob");
names1.add("Cindy");
ArrayList<String> names2 = new ArrayList<String>();
names2.add("Dave");
append(names1, names2);
```

Homework Assignment

In this assignment, you will model the game of ***BulgarianSolitaire***.The game starts with 45 cards. (They need not be playing cards. Unmarked index cards work just as well.) Randomly divide them into some number of piles of random size. For example, you might start with piles of size 20, 5, 1, 9, and 10. In each round, you take one card from each pile, forming a new pile with these cards. For example, the sample starting configuration would be transformed into piles of size 19, 4, 8, 9, and 5. The solitaire is over when the piles have size 1, 2, 3, 4, 5, 6, 7, 8, and 9, in some order. (It can be shown that you always end up with such a configuration.) In your program, produce a random starting configuration and print it. Then keep applying the solitaire step and print the result. Stop when the solitaire final configuration is reached.