Montgomery College, CMSC 203
Worksheet 1
Module 19

Objectives
- Algorithms
- Recursion

Concept Questions

1) In a binary search, ________________________________ .

a) it is assumed that all of the elements are integers.
b) it is assumed that all of the elements are Strings.
c) it is assumed that the search pool is small.
d) it is assumed that the search pool is ordered.
e) it is assumed that the search pool is large.

2) The ___________________ algorithm sorts values by repeatedly comparing neighboring elements in the list and swapping their position if they are not in order relative to each other.

a) insertion sort
b) selection sort
c) bubble sort
d) Array sort
e) alphabetical sort

3) A method that calls itself is a __________________ method.

a) invalid
b) static
c) final
d) recursive
e) public

4) What will be the outcome of this code with the following method call `sum(5678)`

```
public static int sum(int n){
     if(n==0)
          return 0;
     else
          return n%10+sum(n/10);
 }
```

5) What will be the outcome of this code with the following method call `conv(20)`

```
public static void conv(int n) {
        if (n > 0) {
            conv(n / 2);
            System.out.printf("%d", n % 2);
        }
 }
```

6) Calculate the power of the number using recursion and the following recursive method header
`private static long power(int x, int n)`

7) What are the base cases in the following recursive method?

```
 public static void xMethod(int n) {
  if (n > 0) {
    System.out.print(n % 10);
    xMethod(n / 10);
  }
 }
```

a. n > 0
b. n <= 0
c. no base cases
d. n < 0

8) What is the return value for xMethod(4) after calling the following method?

```
static int xMethod(int n) {
 if (n == 1)
   return 1;
 else
   return n + xMethod(n - 1);
```

}

a. 12

b. 11

c. 10

d. 9

9) Which of the following statements are true?

a. Recursive methods run faster than non-recursive methods.

b. Recursive methods usually take more memory space than non-recursive methods.

c. A recursive method can always be replaced by a non-recursive method.

d. In some cases, however, using recursion enables you to give a natural, straightforward, simple solution to a program that would otherwise be difficult to solve.

Programming Questions:

1) Write a recursive string compression method which will count the consecutive repeating letters and replace all but one with a number.

Ex: a string "`HHHHHHeeeello wwOrdl`" will lead to `6H4e2lo 2wOrdl`

2) Print all the permutations of a given string.

Ex: word “abc” will print

```
abc
acb
bac
bca
cab
cba
```

3) Write a recursive string method named underString with a String parameter will add “_” after every character recursively traversing the string.
Ex: a string parameter “Hello” will lead to “H_e_l_l_o”.