Exam Set 11 thru 12E
AP Computer Science A Solutions

Name _____ Period_____

1. Write the following for-loops as while loops

(a)

```
int y;

for(y = 5; y < 10; y+=2)
{

    System.out.println(y);
}
```

```
int y = 5;
while(y < 10){
     System.out.println(y);
     y+=2;
}
```

(b)

```
for(int z = 10; z > 0; z--){

    System.out.println(z);

}
```

```
int z = 10;
while(z > 0){
       System.out.println(z);
       z--;
}
```

/4

2. What is the output for each code segment below,

(a)

```
int m = 0;
int j = 0;

do{
j *= -1;
     if(j >= 0){
   m += 2;
     }
j+=2;

}while(m < 4);

System.out.println(j);
```

2

(b)

```
int i = 5, j = 0;
do{

     for(j = 0; j < i; j++){
          System.out.print("*");
     }
     System.out.println();
     i--;

}while(i > 0);
```

*****
****
***
**
*

/2

_____/13

3. The `Decrypt` class below accepts a number from the user and then converts the number to its character representation. Each pair of numbers in the provided number represent the ascii equivalent of a character and therefore can be used to identify the corresponding symbol.

In the example below, each pair of numbers in `num` map to a different symbol as shown,

num	**pairs**					**ascii equivalents of pairs**				
8773846772	87	73	84	67	72	W	I	T	C	H

Write the `Decrypt` class below. The final string of characters should be stored in `String` called `result`,

```
public class Decrypt{

     public static void main(String args[]){

        int num = Integer.parseInt(args[0]);

        String result = "";

        while(num > 0){
            result = (char)(num%100) + result;
            num/=100;
        }
        System.out.println(result);









      }
}
```

/5

Score _____/13

4. A mathematical sequence is an ordered list of numbers. This question involves a sequence called a *hailstone sequence*. If n is the value of a term in the sequence, then the following rules are used to find the next term, if one exists.

- If n is 1, the sequence terminates
- If n is even, then the next term is n/2
- If n is odd, then the next term is 3n + 1

For this question, assume that when the rules are applied, the sequence will eventually terminate with the term n = 1

The following are examples of hailstone sequences,

Example 1: 5, 16, 8, 4, 2, 1

- The first term is 5, so the second term is 5*3 + 1 = 16
- The second term is 16, so the third term is 16/2 = 8
- The third term is 8, so the fourth term is 8/2 = 4
- The fourth term is 4, so the fifth term is 4/2 = 2
- The fifth term is 2, so the sixth term is 2/2 = 1
- The sixth term is 1, so the sequence terminates

Example 2: 8, 4, 2, 1

- The first term is 8, so the second term is 8/4 = 4
- The second term is 4, so the third term is 4/2 = 2
- The third term is 2, so the fourth term is 2/2 = 1
- The fourth term is 1, so the sequence terminates.

The length of a hailstone sequence is the number of terms it contains. For example, the hailstone sequence in example 1 (5, 16, 8, 4, 2, 1) has a length of 6 and the hailstone sequence in example 2 (8, 4, 2, 1) has a length of 4.

In the space below are your algorithm which calculates the length of a hailstone sequence that starts with n.

```
int n = 8;
int count = 1;
while(n > 1){
    if(n % 2 == 0){
        n = n/2;
    }else{
        n = 3*n + 1;
    }

    count++;
}
System.out.println(count);
```

Score _____/13

5. The CountFlips class below simulates how many flips it takes to achieve a specified streak of heads. Below are some examples,

Streak	**Number of flips required to get 10 heads in a row**
10	395
12	2648
15	93833

Complete the CountFlips class below.

```
int flips = 0;
int streak = 10;
int heads = 0;
while(heads < streak){

    if(Math.random() < .5){
        heads++;
    }else{
        heads = 0;
    }
    flips++;
}
System.out.println(flips);
```