APCS TEST CHAPTER 12 VERSION 1A, SHOW ALL WORK FOR FULL CREDIT
NAME:_____

1. Find the recursive formula for the following sequence of integers: 14, 3, -11, -14, -3, 11, 14,...

    a. $a_n = a_{n-1} + a_{n-2}$
    b. $a_n = a_{n-1} + 8$
    c. $a_n = a_{n-1} - a_{n-2}$
    d. $a_n = a_{n-2} - a_{n-1}$

2. Bob decides to play with his dominoes. He has two sizes and an unlimited supply: either 1x1 or 1x2. He wants to find the number of ways he can place these two types of dominoes in a structure of width k and length 1. Which of the following represents a recursive relation for the number of ways, denoted a_k, for $k > 2$?

    a. $a_k = a_{k-1} + a_{k-2}$
    b. $a_k = a_{k-1} * a_{k-2}$
    c. $a_k = 2k - 3$
    d. $a_k = 2a_{k-1} - 1$

3. Given that $a_0 = 0$ and $a_1 = 1$ for the Fibonacci sequence, which of the following is a valid base case for the following recursive method?

```
int mystery(int x) {
        //BASE CASE
        return f(x - 1) + f(x - 2);
}
```

    a. if (x == 0) return 0;
    b. if (x == 1) return 1;
    c. if (x < 2) return x;
    d. if (x == 0 || x == 1) return 1;

4. What does the following method return when run with n = 16?

```
public int mystery(int n) {
        if (n <= 0) {
                return n;
        }
        if (n % 3 == 1) {
                return 1 + mystery(n - 1);
        }
        if (n / 5 == 2) {
                return 3 + mystery(n - 2);
        }
        return -1 + mystery(n - 3);
}
```

Returns:_____

Free-Response Questions

5. Adhit loves the letter "O". However, he only likes it after the letter "W". Write a recursive function that appends an "O" after every "W" in a given string and returns it. You may pass only **ONE** parameter to the method.

```
public String addO(_____) {




}
```

6. Oh no! The alien UwUs have come back after an entire semester of absence with Divya as their leader! This time, they are attacking in the following recursive formation:

   Level 1 formation: UwU
   Level 2 formation: UwUUwwUUwU
   Level 3 formation: UwUUwwUUwUUwwwUUwUUwwUUwU

   Notice how Level 1 is used in the Level 2 formation and how Level 2 is used in the Level 3 formation.

   Please help the remaining survivors of the attack write a method that can predict the formation of a **level n** formation. You may pass only **ONE** parameter to the method.

   public String predict(_____) {

   }

7. Given a set of characters and a positive integer k, print all possible strings of length k that can be formed from the given set. You may pass multiple parameters to your method. Organize your code however you'd like to, but make sure you use a recursive method to get the string combinations and make sure to print out the strings at the end.

   Ex.

```
Input:
      set[] = {'a', 'b'}, k = 3

Output:
      aaa
      aab
      aba
      abb
      baa
      bab
      bba
      bbb
```