HW #7

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HW #7
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Due: 11:00 pm, Sunday Oct. 28, 2018 at Google Classroom

1. (15 pts) Write a function called sumEven that takes an int array and its length as parameters and returns the sum of all elements at even indices in the array.

```
int sumEven(int arr[], int len) {
   int sum = 0;
   for (int i = 1; i <= len; i += 2) {
      sum += arr[i];
   }
   return sum;
}
```

2. (20 pts) The Fibonacci sequence is defined as a sequence of integers where each number is the sum of the two preceding ones. The following function returns the n^{th} Fibonacci number. Show the computation steps for Fibonacci(4)

```
int fibonacci(int n) {
   if (n == 0)
      return 0;
   else if (n == 1)
      return 1;
   else
      return fibonacci(n-1) + fibonacci(n-2);
}
```

fib(3) + fib(2) = fib(2) + fib(1) + fib(1) + fib(0) =
fib(1) + fib(0) + fib(1) + fib(1) + fib(0) =
1 + 0 + 1 + 1 + 0 = 3

3. (10 pts) What does the following function return for each input case of a and b below?

```
int puzzle(char val[], int a, int b) {
   if (a > b) {
```

```
      return 1;
   } else if (val[a] == val[b]) {
      return puzzle(val, a+1, b-1);
   } else {
      return 0;
   }
}
```

a. val = {'k', 'a', 'y', 'a', 'k'} a = 0 b=4

1

b. val = {'m', 'a', 'x', 'x', 'i', 'm'} a = 0 b=5

0

4. (16 pts) The following function counts the occurrences of character x in an array. Fix the errors.

```
int countOccurences(char data[], char x, int idx) {
   int count = 0;
   if (data[idx] == x)
      count = 1;
   return countOccurences(data, x, idx++);
}
```

```
int countOccurences(char data[], char x) {
    int count = 0;
    int len = (sizeof(*data) / sizeof(char));
    for (int idx = 0; idx <= len; idx++)
        if (data[idx] == x)
            count += 1;
    return count;
}
```

5. (9 pts) What is the output of the following program?

```
#include <stdio.h>

void changeme(int number) {
   number = number + 10;
}
```

```
int main(void) {
        int x = 17;
        changeme(x);
        printf("%d \n", x);

        changeme(x++);
        printf("%d \n", x);

        changeme(++x);
        printf("%d \n", x);

        return 0;
}
```

17
18
19

6. (30 pts) Consider the following program with only the variable declarations shown. For each statement below, specify whether it is true or false and explain why.

```
int x;
void alpha(int a){
        int b;
}

void beta() {
        static int k;
}

void gamma(int x) {
}

int main(){
        int x, y, z;
        {
                int y, z;
        }
}
```

a. (7 pts) Function alpha can access the external variable x
True, x is a global variable declared outside of all functions

b. (7 pts) Function main has access to the static variable k declared inside function beta
False, k is a local variable within beta

c. (7 pts) In the inner block of the main function, the block variable y hides the local main variable y
True, the block variable will take precedence over the local main y

d. (7 pts) Function beta is the only function that can access global variable x
False, all functions can access x

e. (6 pts) In function main, local variable x is not accessible inside the inner block

False, since x was declared outside the block it can be accessed within it