Assignment3

Before doing this assignment, you should already know the following things:

- Define and Call a Function
- Recursion
- Namespace
- Multi-file compilation

Review Questions

(You should write the answers to the following questions in the same file)

1. Write the following functions

    - Replace one char with another in a string(array of char) and return the number of replacements. Below is the function prototype in header file.

    ```
    // replace all a in str with b, len is the length of the string
    int replace(char str[], int len, char a, char b);
    ```

    - Convert Cartesian coordinates(x, y) to polar coordinates(ρ, θ), use `sqrt(x)` to find square root of x and `atan(y)` to find the inverse trigonometric, which is arctangent of y. Below is the struct and function prototype in header file.

    ```
    // struct of cartesian coordinates
    struct Cartesian {
        float x;
        float y;
    };
    // struct of polar coordinates
    struct Polar {
        float x;
        float y;
    };
    // Convert Cartesian coordinates to polar coordinates
    Polar cartesian2Polar(Cartesian pos);
    ```

2. Briefly describe the benefits of putting the function prototype in the header file.

Programing Exercise

1. Write a function which input a string(char array) and two numbers (let say a and b). The function should reverse all the item between and including the index a and b. And it returns a bool indecates if the input is valid. (You can define helper functions if needed)

For example, input is "robomaster2022", a=0 b=5, the returned bool is true and the string will be "amoborster2022". If the input is a=5 b=0 then it is not valid, return false and the string remain the same.

2. Write a program that can output the first n numbers of Fibonacci sequence. For example, n=10, the first 5 numbers of Fibonacci sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

We have provided the skeleton code (exer3_1.cpp and exer3_2.cpp), you only need to complete the calculation part. For compiling and running the code, using the following commend lines:

```
# compile
g++ -o exer_run3_1 exer3_1.cpp
g++ -o exer_run3_2 exer3_2.cpp
# run
./exer_run3_1
./exer_run3_2
```

If you want to know more about compiling with g++, click here

DO NOT FORGET TO COMMIT AND PUSH YOU CODE :)