Information Security Homework #1

I. Please find the vulnerabilities in the following programs and explain their potential security risks (15 points)

1.

```c
#include<ctype.h>
#include<string.h>
#include<stdio.h>

void reveal_secret(){
    fputs("SUPER SECRET =42\n",stdout);
}

int verify(const char * name){
    char user[256];
    for(int i=0;name[i]!='\0';++i){
        user[i]=tolower(name[i]);
    }
    user[i]='\0';
    return strcmp(user,"xyzzy")==0;
}

int main(){
    char login[512];
    fgets(login,512,stdin);
    if(! verify(login)){
        return 1;
    }
    reveal_secret();
    return 0;
}
```

,

2.

```c
#include<stdio.h>
void loop(){
    int i=0;
    int a[]={1,2,3,4,5,6,7,8,9,10};
    for(i=0;i<11;i++){
        a[i]=0;
        printf("Hello World");
    }
    return ;
}

void main(){
    loop();
    printf("Hello C++");
    return ;
}
```

3.

```c
#include<stdlib.h>
#include <stdio.h>
#include <string.h>

static int secret;

int func(char *name)
{
    int canary=secret;
    char buffer[12];
    strcpy(buffer, name);
    if(canary==secret){
        return 1;
    }else{
        exit(1);
    }
}

int main(int argc, char *argv[])
{
    secret=getRandomNumber();
    char str[256];
    if(fgets(str,256,stdin)==NULL){
        return 0;
    }
    func(str);
    return 0;
}
```

II.Read the following code and answer: Except for " Ft369BfiA", what can be entered to make the program output "Welcome!\n"? (10 points)

Tip: you can enter multiple times

```c
#include <stdio.h>
#include<string.h>

void verify(){
    char true_password[16] = "Ft369BfiA";
    int a[4]={0,1,2,3};
    char inputs[16];
    while (1){
        printf("Please enter your password:");
        gets(inputs);
        if (strcmp(inputs,true_password)){
            printf("Sorry,your password is wrong!\n");
        }
        else{
            printf("Welcome!\n");
        }

    }
}

int main()
{
    verify();
    return 0;
}
```

III.Read the following code and draw the stack structure of the program when the 4th line of code is executed.(10 points)

```
1   #include<stdio.h>
2
3   int GetAvgScore(int score1,int score2){
4       int avg_score=(score1+score2)/2;
5       return avg_score;
6   }
7
8   int  GetScores(int math_score,int physics_score){
9       int total_score=math_score+physics_score;
10      int avg_score=GetAvgScore(math_score,physics_score);
11      printf("score: %d: %d",total_score,avg_score);
12      return total_score;
13  }
14
15  int main(){
16      int score=GetScores(82,88);
17      return 0;
18  }
```

➢ Submission method

- Please name the PDF file "2024.M2.InformationSecurity_hw1_yourname" then email it to both TA and Teacher before 11:59 pm on December 5. Email title has the same name as the PDF file.
- Please refer to the file “Homework template.docx” for the homework format.