Exercise 1

Log into your VM, open the terminal, type in `infosec pull 1`: behold `/home/user/1/`!

1. **(30 pt)**

   Write an Assembly x86 program that receives an integer in `EBX`, computes its greatest prime factor, and stores the result in `EAX`; if the integer is less than or equal to 1, the result should be 0.

   Add your assembly instructions as strings to `q1.c` between our comments, like so:

```
19      asm (
20          /* Your code starts here. */
21
22          "MOV EAX, 1;"
23          "MOV EBX, 2;"
24          "ADD EAX, EBS;"
25
26          /* Your code stops  here. */
27      );
```

   To compile your program, run `gcc q1.c -masm=intel -o q1`:

```
/home/user/1$ gcc q1.c -masm=intel -o q1
/home/user/1$
```

   To test your program, run `./q1` *`number`* on some number, and it should print the result:

```
/home/user/1$ ./q1 10
5
/home/user/1$ ./q1 12
3
/home/user/1$ ./q1 -5
0
/home/user/1$
```

2. **(30 pt)**

   Write an Assembly x86 program that receives an integer in `EBX`, computes its Fibonacci number using recursion, and stores it in `EAX`; if the integer is less than 0, the result should be 0. Fibonacci numbers are the numbers of the sequence 0, 1, 1, 2, 3, 5, 8… defined as:

   $$a_0 = 0 \qquad a_1 = 1 \qquad a_n = a_{n-2} + a_{n-1}$$

   Add your assembly instructions as strings to `q2a.c`, compile and test like before:

```
/home/user/1$ gcc q2a.c -masm=intel -o q2a
/home/user/1$ ./q2a 0
0
/home/user/1$ ./q2a 1
1
/home/user/1$ ./q2a 2
1
/home/user/1$ ./q2a 3
2
/home/user/1$ ./q2a 4
3
/home/user/1$ ./q2a 5
5
/home/user/1$ ./q2a 6
8
/home/user/1$
```

   (20 pt)

   Write the same program, this time without using recursion, and submit it as `q2b.c`.

3. **(20 pt)**

   Read the following Assembly x86 program and describe what it does in `q3.txt`.

```
1 MOV ECX, 0
2 XOR EDX, EDX
3 _LABEL:
4 CMP [ESI], DL
5 JZ _END
6 INC ECX
7 INC ESI
8 JMP _LABEL
9 _END:
```

A few general notes:

1. Consider edge cases.
2. Document your code.
3. Don't use any 3rd-party libraries or Python packages the grader wouldn't have.
4. If your answer takes an entire page, you probably misunderstood the question.
5. Funny answers don't get extra credit, but do help the grader deal with existential angst.