1. One Time Pad - 10p

For the first time, Gigel wants to implement One Time Pad. The algorithm consists in performing the XOR operation between a message (plain) and a key (key), of the same length as the message, as follows:

cipher [i] = plain [i] ^ key [i]

It requires the implementation, in the assembly, of the function that performs the encryption of One Time Pad.
The function header, in C, is:
void otp (char * ciphertext, char * plaintext, char * key, int length)

2. Caesar Cipher - 15p

Dissatisfied with the security of the previous solution, Gigel also tries the Caesar Cipher. It receives a message and a key, represented by a number, and moves each letter in the message in a circle with the value specified by the key. By circular scrolling is meant that the lowercase letters will remain, after scrolling, lowercase, and the uppercase letters will remain uppercase letters.

Encryption example, for the message "Azazel", using the keys 0, 1, 2, 3:

Key Message Coding
Azazel 0 Azazel
1 Babafm
2 Cbcbgn
3 Dcdcho
The function header, in C, is:

```
void caesar (char * ciphertext, char * plaintext, int key, int length)
```

Characters that are not letters will not be encrypted.

3. Vigenere Cipher - 25p

Wanting to keep his options open, Gigel is also trying the Vigenere Cipher. It receives the message to be encrypted and a key, represented by a string of capital letters. If the key is shorter than the message, it extends the length of the message by repeating the original key. Then, each letter in the message is moved circularly to the right a number of times equal to the position in the alphabet (starting from position 0) of the corresponding letter in the key.

Encryption example:

Message: Donald Trump
Key: BIDEN
Extended key: BIDENB IDENBI

Encrypted message: Ewqeye Buyzq
The first letter of the message, 'D', is moved one position to the right, becoming 'E', as the position of the corresponding letter in the extended key, 'B', in the alphabet, is 1 (numbering starts from 0).

Characters that are not letters will be ignored. The encryption of the message is equivalent to the encryption of the message from which only the letters are kept
The function header, in C, is:

void force (char * ciphertext, char * plaintext, int plaintext_len, char * key, int key_len)

4. StrStr - 25p

Realizing that his formula is quite twisted, Gigel wants a quick way to find keywords. SrtStr is a function that finds the first appearance of a substring in a source string. Its implementation in the assembly is required.

The function header, in C, is:

void my_strstr (int * substr_index, char * haystack, char * needle, int haystack_len, int needle_len);

In the first parameter of the function you will retain the index of the first occurrence of the substring in a row.

If the subsequence is not found in the original string, you will return the length of the original string + 1

5. Binary to Hexadecimal - 15p

In order to make it easier to troubleshoot problems with its programs, Gigel wants to understand the car language a little better. The goal is to perform a function that will pass the numbers from base 2 to base 16.The function header, in C, is:

```
void bin_to_hex (char * hexa_value, char * bin_sequence, int length);
```

You will transform the received bit sequence as a parameter into its base 16 correspondence.

```
  1011111011101111 -> 1011 1110 1110 1111 -> beef
```