Exercise 3

In order to implement the arithmetic coding, a simple recursive function is used.
First of all, an external function takes the input, one string for the alphabet, one for the string to encode and the vector of probabilities. To better handle the alphabet probabilities, it is used a map
which has as keys the characters and as values the probabilities.
The recursive function takes the initial range [0, 1] and based on the character of the string in that moment condiders the appropriate sub-range. Once the two values, lower bound and higher bound, are obtained, the function calls the float2bin function. Through this simple algorithm the floating point numbers are converted into arrays of binary digits.

Finally, the final codeword is put equal to the lower bound.

To make the sanity checks the gui calls the funcion 'controls', which checks if the probabilities and the alphabet in input have the same length and if in the string there are only charachters which exist in the alphabet.