Criptografie - knapsack cryptosystem

- is_coprime(a:int, b:int): bool
  - Checks whether two numbers are coprime (i.e., their greatest common divisor is 1).

- mod_inverse(a:int, m:int): int
  - Calculates the modular inverse of **a** under modulo **m**, such that $(a \cdot x) \bmod m = 1$

- generate_superincreasing_sequence(n:int): list[int]
  - Generates a superincreasing sequence, where each term is greater than the sum of all previous terms.

- generate_keys(n:int)
  - Returns a tuple containing: the public key(list[int]), the private key(list[int]), the multiplier(int) and the modulus(int)
  - Generates the public and private keys based on a superincreasing sequence, a random modulus, and a multiplier.

- validate_plaintext(plaintext:string): string

    - Validates that the plaintext contains only characters in the defined alphabet.

- encrypt(plaintext:string, public_key:list[int]):list[int]
    - Encrypts the plaintext by: validating the plaintext, converting each character to its binary representation, calculating the ciphertext using the public key.

- validate_ciphertext(ciphertext:list[int]): list[int]
    - Validates that the ciphertext is a list of non-negative integers.

- decrypt(ciphertext:list[int], private_key: list[int], modulus:int, multiplier:int): string
    - Decrypts the ciphertext by: computing the reduced value using the modular inverse of the multiplier, reconstructing the binary representation of each character using the private key, mapping the binary representation back to the plaintext.