MAT 331-Fall 20: Homework 4

Exercice 1. *(a) (1 point) Write a function **double_ list(l)** that takes a list of numbers l and returns a list with all the entries of l multiplied by two.*
*For example, **double_ list([1,2,4])** will return the list*

$$[2, 4, 8]$$

Exercice 2. *(a) (1 point) Implement a scalar product between two vectors of $\mathbb{R}^n$ (without using any additional library).*

(b) (1 point) Implement the multiplication between a $n \times n$ matrix and a vector of $\mathbb{R}^n$ (without using any additional library).

Exercice 3. *(Permutation and texts)*

*(a) (3 point) Write a function **convert_ text(t)** that takes a string t containing only lower case letters, no space, and returns a list of numbers between $0, \ldots, 25$, where a corresponds to 0, b to 1 and z to 25 (you can use the function str.find()).*

(b) (4 points) Every permutation can be decomposed into a product of transposition, implement a program that takes any permutation σ of $\{0, \ldots, n\}$ and determines some transposition $\tau_1, \ldots, \tau_k$ where $k \geqslant 0$ such that

$$\sigma = \tau_1 \circ \ldots \circ \tau_k. \tag{1}$$

(You can either print the result or return a list of transposition)