29.11.2022

# Laboratory 5

2.

a) Write a function to return the product of two vectors.
https://en.wikipedia.org/wiki/Dot_product

b) Write a function to return the depth of a list. Example: the depth of a linear list is 1.

c) Write a function to sort a linear list without keeping the double values.

d) Write a function to return the intersection of two sets.

a.

$$myDotProduct(l_1 \dots l_n, k_1 \dots k_m) = \begin{cases} 0, & \text{if } n = 0 \text{ or } m = 0 \\ -1, & \text{if } n \neq m \\ l_1 * k_1 \oplus myDotProduct(l_2 \dots l_n, k_2 \dots k_m), & \text{otherwise} \end{cases}$$

b.

$$myMax(a, b) = \begin{cases} a, & \text{if } a > b \\ b, & \text{otherwise} \end{cases}$$

$$myFindDepth(l_1 \dots l_n, c) = \begin{cases} c, & \text{if } n = 0 \\ myMax(myFindDepth(l_1, c+1), myFindDepth(l_2 \dots l_n, c)), & \text{if } l_1 \text{ is a list} \\ myFindDepth(l_2 \dots l_n, c), & \text{otherwise} \end{cases}$$

$$myMain(l_1 l_2 \dots l_n) = myFindDepth(l_1 l_2 \dots l_n, 1)$$

c.

$$myInsert(l_1 l_2 \dots l_n, e) = \begin{cases} \{e\}, \text{ if } n = 0 \\ l_1 l_2 \dots l_n, \text{ if } l_1 = e \\ \{e\} \cup l_1 l_2 \dots l_n, \text{ if } e < l_1 \\ \{l_1\} \cup myInsert(l_2 \dots l_n, e) \end{cases}$$

$$mySort(l_1 l_2 \dots l_n) = \begin{cases} nil, \text{ if } n = 0 \\ myInsert(mySort(l_2 \dots l_n), l_1), \text{ otherwise} \end{cases}$$

d.

$$myContains(e, l_1 l_2 \dots l_n) = \begin{cases} nil, \text{ if } n = 0 \\ true, \text{ if } l_1 = e \\ myContains(e, l_2 \dots l_n), \text{ otherwise} \end{cases}$$

$$myIntersection(l_1 \dots l_n, p_1 \dots p_m) = \begin{cases} nil, \text{ if } n = 0 \text{ or } m = 0 \\ \{l_1\} \cup myIntersection(l_2 \dots l_n, p_2 \dots p_m), \\ \quad \text{if } myContains(l_1, p_1 \dots p_m) \text{ is true} \\ myIntersection(l_2 \dots l_n, p_1 \dots p_m), \\ \quad \text{otherwise} \end{cases}$$