

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.

$$a. \text{ myDotProduct}(v_1 = l_1 l_2 \dots l_m, v_2 = k_1 k_2 \dots k_m) = \begin{cases} 0, & \text{if } \text{len}(v_1) = 0 \\ v_1 * v_2 + \text{myDotProduct}(l_2, \dots, l_m, k_2, \dots, k_m), & \text{otherwise} \end{cases}$$

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

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

$$\text{myMain}(l = l_1 l_2 \dots l_m) = \text{myFindDepth}(l_1 l_2 \dots l_m, 1)$$

$$c. \text{ myInsert}(l = l_1 l_2 \dots l_m, c) = \begin{cases} \text{list}(c), & \text{if } \text{len}(l) = 0 \\ l_1 l_2 \dots l_m, & \text{if } l_1 = c \\ \{c\} \cup l_1 l_2 \dots l_m, & \text{if } c < l_1 \\ \{l_1\} \cup \text{myInsert}(l_2 \dots l_m, c) \end{cases}$$

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mySort (l = l1 l2 ... lm) = {
  nil, if len(l) = 0
  myInsert (mySort (l2 ... lm), l1), otherwise
}

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d. myContains (e, l = l₁ l₂ ... l_m) = {
 nil, if len(l) = 0
 true, if l₁ = e
 myContains (e, l₂ ... l_m), otherwise
}

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myIntersection (l = l1 l2 ... lm, p = p1 p2 ... pm) = {
  nil, if len(l) = 0
  { l1 } ∪ myIntersection (l2 ... lm, p2 ... pm), if
    myContains (l1, p1 p2 ... pm) is true
  myIntersection (l2 ... lm, p1 p2 ... pm), otherwise
}

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