Cogs 502 Fall 2018

Symbols and Programming Assignment 04 due Oct 31, 8pm

Question 1

Let SNOC be a function that takes two arguments like CONS, but puts the first argument to the *end* of the list rather than to the front. Write two versions: one using LIST and APPEND, and one using REVERSE and CONS.

Question 2

A palindrome is a sequence that reads the same from left to right and right to left. Write a function that checks whether its list argument is a palindrome. You can use the built-in REVERSE.

Question 3

Write a function HOWCOMPUTE taking 3 numbers, telling the basic arithmetic operation that is used to compute the third number from the first two – it should say so if it cannot find it. Your response can be one of ADDED, MULTIPLIED, DIVIDED, SUBTRACTED, DONT-KNOW.[1]. Use COND in your answer.

Question 4

Write a function LISTPRO that returns the product of all the numbers in a list; allow for non-numbers in the list, ignore them when you come across during your iteration.

Question 5

Write a function REVERSE2 that returns the reverse of a given list. Do not use the builtin REVERSE, use DOLIST, LET and SETF.

Question 6

Write a function NESTEDP that takes a list and returns T if at least one of its elements is a list, and returns NIL otherwise.[2]

Question 7

Write a function REMOVE2 that takes an element and a list; and returns a list where all the occurrences of the element are removed from the list.

Question 8

Write a function REMOVE3 that takes an element and a list; and returns a list where all the occurrences of the element that are preceded by the symbol X are removed from the list. You need to store the element seen in the previous iteration in a variable; therefore you can check whether it is X.

Question 9

Write a function TYPES that takes a list and prints out the type of the elements encountered. It's enough that it can tell between number, list and symbol; so use NUMBERP, LISTP and SYMBOLP. In case you cannot match to any of these, print UNKNOWN-TYPE. Put a string in your list for testing, it answers NIL to all these predicates. Use DOLIST and COND in your solution.

Question 10

Write a function LAST2 that takes a list and returns the last element of the list. Of course, don't use LAST. One way could be to keep a counter as we did in class, so that you can compare this to the length of the list to recognize whether you are close enough to the end of the list.

Question 11

Write a function REMOVE-LAST that takes a list and returns a version where the last element is missing.

[1] Touretzky 1990, ex. 4.13

[2] Graham 1996, p. 30 ex. 7.