

Assignment #3 on Scheme and Common Lisp

Date Due: November 8, 2024

Total: 100 marks

Include for all programs both rules/code and execution (.scm, or .lis source code, a README and a RUN file for each program).

Include for all programs both rules/code and execution. Don't use code from the internet. Write your own code. Don't use built-in functions that will solve the problem for you; that will defend the purpose of the assignment.

Write the corresponding programs in both languages Common Lisp and Scheme for the following:

1. (10 marks) Write a function that computes the sum of all odd divisors of all numbers that are multiple of 7 and are between two other natural numbers. The two natural numbers are read from standard input. Don't use builtin functions of code pulled from the internet. Write your own code!
2. (10 marks each) Write a function that accepts a list of numbers and two integers as input and returns the sublist between the positions represented by the two numbers.

Example:

```
>(slist '(10 7 6 5 3 1) 2 3))
; Value: (7 6)
>(slist '(10 7 6 5 3 1) 3 2))
; Value: ()
>(slist '(10 7 6 5 3 1) -1 2))
; Value: (10 7)
```

3. (5 marks) Write a function to interactively guess an odd number in the interval 2000 to 4000 that is also a multiple of 3 plus 1, in at most k tries. In case the user types an even number, the number of tries is reduced by an additional try. After each try, the number of remaining tries should be displayed.

Output can be obtained with function (`write X`) in clisp and (`display X`) in scheme, and input with the function (`read X`) (in both Scheme and Lisp). The secret number can be hardcoded. The number k is read from the standard input.

4. (5 marks each) Write a function which computes: $\sum_{i=0}^n f(i)^3 + 1$, where f is a polynomial function of degree at least 3 (the choice of f is yours).
5. (10 marks) Write a function to interactively guess an element from two lists (stored internally) in at most k tries, where k is also an input (integer) value. The program should precalculate the maximum and minimum number from both lists and should tell the user if the number is out of bounds. Therefore, you input k followed by at most k tries.

The result of the function will be the secret word if you guess it a message like “you lost” otherwise. To read the number n , you can use the function (`read X`) in both scheme and lisp, and the functions (`write X`) in clisp, respectively (`display X`) in scheme.

6. (15 marks) Write a function to interactively compute the price for a menu. You should have at least 5 questions for menu choices, accept quantities, then compute the total amount and display it. In case the quantity required for a certain item exceeds the amount available, it should be adjusted to the maximum available and the user warned about the adjustment being made. The result of the function should be the total price for that menu.