Homework #1

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| 1. There are two types of abstractions, such as Data abstraction and Control abstraction.   Data abstraction reduce the complexity of behavior and attributes of data to represent it in the program.  There are two examples, such as Linked List and character strings in program.  Linked List provide operations on data and the character strings Is providing a data structure to keep track of collection of element.  Control abstraction is about subroutine or function and hide procedural data, such as loop and if else statement. |
| 1. The Interpreter executes program directly, but translator can executes other program or transforms other program to different form and executes it. |
| 3.  (**defun** grade (N)  (cond  ((< N 60) 'F)  ((< N 70) 'D)  ((< N 80) 'C)  ((< N 90) 'B)  (T 'A)  )  )  (mapcar #'grade '(55 65 75 85 95)) |
| 4.  (**defun** fast-power (b e)  (power-helper b e 1)  )  (**defun** power-helper(b e n)  (cond  ((= e 0) n)  ((= e n) b)  ((\* b (power-helper b (- e 1) 1)))  )  ) |
| 5a.  (**defun** unionOfList (l1 l2)  (cond  ((null l1) l2)  ((member (first l1) l2) (unionOfList (rest l1) l2))  (T (cons (first l1) (unionOfList (rest l1) l2)))  )  ) |
| 5b.  (**defun** diff (l1 l2)  (cond  ((null l1) nil)  ((member (first l1) l2) (diff (rest l1) l2))  (t (cons (first l1) (diff (rest l1) l2)))  )  ) |
| 6.  (**defun** rotateLeftByOne (L)  (if  (null L) nil  (append (rest L) (list (first L)))  )  )  (**defun** rotate (L n)  (cond  ((= n 0) L)  ((null L) nil)  (t (rotate (rotateLeftByOne L) (1- n))  ))  ) |
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