

CSCI 4230 – Assignment 3

Instructions

For this assignment you must write the following functions in Scheme:

1. Write a function called **slope** that takes two arguments, both pairs of numbers representing points, and calculates the slope of the line between those two points.
2. Write a predicate called **square?** that takes one argument, a number, and returns **#t** if that number is the square of two integers.
3. Write a function called **replace-first** that takes two arguments, an item and a list, and returns a version of the list with its first element replaced by the item. If the list is empty (you can use the **null?** predicate to determine this) return the empty list.
4. Write a function called **replace-first!** that takes the same arguments as **replace-first** but modifies the list itself using **set-car!**.
5. Write a recursive predicate called **all-odd?** that takes a list as an argument and returns **#t** if every number in a list is odd, and returns **#f** if any number in the list is even. If the list is empty, return **#t**.
6. Write a recursive function called **filter-odd** that takes a list as an argument, and returns a list containing only the odd numbers in the original list. If the list is empty, return the empty list.
7. Write a recursive function called **product** that takes a list of numbers as an argument and returns the result of multiplying them all together. If the list is empty, return 1.
8. Write a recursive function called **smallest** that takes a list of numbers as an argument and returns the smallest number in the list. The function does not need to work on the empty list.
9. Write a recursive function called **remove-first** that takes a number and a list of numbers as arguments and returns a list consisting of the items in the original list with the first occurrence of the number removed. If the list is empty, return the empty list.
10. Write a recursive function called **selection-sort** that takes a list of numbers as an argument and uses **smallest** and **remove-first** to perform a selection sort on the list. If the list is empty, return the empty list.

What to Hand In

Implement all of the functions described above in a source file called **yourlastnameAssign3.scm** with your actual last name. Upload the source file to D2L to the dropbox called Assignment 3.