Programming Fundamentals Using Python

2018

Problem Set 8

Most recent updated: July 13, 2018

Objectives

1. Recursion
2. Recurrance Relations

Note: Solve the programming problems listed using your favorite text editor. Make sure you save your programs in files with suitably chosen names, **and try as much as possible to write your code with good style (see the style guide for python code)**. In each problem find out a way to test the correctness of your program. After writing each program, test it, debug it if the program is incorrect, correct it, and repeat this process until you have a fully working program. Show your working program to one of the cohort instructors.

Problems: Cohort sessions

1. *Recursion: Merge Sort* Write a function that does Merge sort on a list of numbers. Measure the time and compare its computation time with that of insertion sort and Python's built-in function `sorted()`.

2. *Recursion: Coin Change* Write a function that find the smallest number of coins that represent the given value. There are only four possible coins: 10 cents, 20 cents, 50 cents, and 100 cents (1 dollar). The function should return a dictionary with the coin value as its key and the number of coins as its value. For example:

```
>>> assert coin_change(50) == {50:1}
>>> assert coin_change(80) == {50:1, 20:1, 10:1}
>>> assert coin_change(120) == {100:1, 20:1}
>>> assert coin_change(90) == {50:1, 20:2}
```

3. *Recursion: Palindrome* Redo palindrome problem with Recursion. Derive the recurrence relations and analyze its complexity.

End of Problem Set 8.