

CS325 Winter 2013: HW3

Due Feb 1st in class

Hand in Instructions Read the guidelines for written assignments on the course web site. You are highly encouraged to work in groups of up to three.

1. Textbook 4.1
2. Textbook 5.2
3. Textbook 5.5
4. Textbook 5.7
5. Consider the Change Problem in Austria. The input to this problem is an integer L . The output should be the minimum cardinality collection of coins required to make L shillings of change (that is, you want to use as few coins as possible). In Austria the coins are worth 1, 5, 10, 20, 25, 50 Shillings. Assume that you have an unlimited number of coins of each type. Formally prove or disprove that the greedy algorithm (that takes as many coins as possible from the highest denominations) correctly solves the Change Problem. So for example, to make change for 234 Shillings the greedy algorithms would take four 50 shilling coins, one 25 shilling coin, one 5 shilling coin, and four 1 shilling coins.
6. Consider a long quiet country road with houses scatter very sparsely along it (We can picture the road as a long line segment). You want to place cell phone base stations at certain points along the road, so that every house is within four miles of one of the base stations.

Give an efficient algorithm that achieves this goal, using as few stations as possible. Show that the algorithm achieve the optimal solution using the “stay ahead” argument.