Overview

1 Design an Algorithm

You are given two lists of sorted numbers. Design an algorithm to find all the common elements in the two lists. For example, given `[4, 7, 7, 7]` and `[4, 4, 6, 7, 7, 9]`, the output should be `[4, 7, 7]`.

a. Describe your algorithm as pseudocode.

b. Explain why it works correctly.

c. What is the maximum number of comparisons your algorithm makes, in terms of the lengths of the two lists (call them m and n, respectively)?

2 Coin Change

Part 1

Prove that given an unlimited supply of 4-cent coins and 9-cent coins, one can make any amount of change of 32 cents or larger.

Part 2

Based on Part 1, describe a recursive algorithm to make change using 4-cent and 9-cent coins for any amount greater than or equal to 32 cents.

procedure CoinChange4and9(n)

▷ *Input: an integer n; assume $n \geq 32$*
Output: a pair of integers (a, b) such that $n = 4a + 9b$.

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