**Problem 1 Maximum Difference (10 pts)**

Given an array of numbers x1,...,xn we are interested in finding

D=max(xj−xi) where 1≤i≤j≤n

Describe an efficient algorithm that calculates D. In addition to describing the algorithm, explain the efficiency of your algorithm clearly.

<https://www.chegg.com/homework-help/questions-and-answers/care-4-given-array-numbers-x--xn-interested-finding-d-max-x-x-ilizjan-describe-lineas-algo-q95984733?trackid=6af7644e550b&strackid=b3be1bf2d131>

**Problem 2 Minimum Number of Coins (10 pts)**

Given is a list of K distinct coin denominations (V1,...,Vk) and the total sum S>0. Find the minimum number of coins whose sum is equal to S (we can use as many coins of one type as we want), or report that it’s not possible to select coins in such a way that they sum up to S. Justify your explanation

<https://stackoverflow.com/questions/4247662/the-minimum-number-of-coins-the-sum-of-which-is-s>

<https://www.topcoder.com/thrive/articles/Dynamic%20Programming:%20From%20Novice%20to%20Advanced>

**Problem 3 Consecutive sums (5 + 5 = 10 pts)**

Let (a1,...an) be a sequence of distinct numbers some of which maybe  negative. For ≤i≤j≤n, consider the sum

Sij=ai+....+aj

a) What is the running time of a brute force algorithm to calculate max Sij?

b) Give an efficient algorithm to find the above maximum. In addition to giving the algorithm, describe the efficiency of your algorithm clearly.

<https://www.chegg.com/homework-help/questions-and-answers/familiar-maximum-let-01-d2--sequence-distinct-numbers-maybe-negative-1-si-q95984059?trackid=60d223cfffab&strackid=066d196a7796>

**References**:

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[2] https://en.wikipedia.org/wiki/Prim%27s\_algorithm

[3] Introduction to Algorithms, Cormen, Third Edition. (CLRS)

[4] LucidChart Visualization Tool