

Homework #5
CS 329E

Due date: March 4.

1. Redo all problems in homework #3 for which you did not get full credit, and (please) do it carefully. Hand it in with the original homework #3.
2. Give a dynamic programming algorithm for the following problem:
 - Input: set $S = \{x_1, x_2, \dots, x_n\}$ of positive integers and positive integer B
 - Output: largest value $q \leq B$ such that there is a subset $A \subseteq S$ such that $\sum_{a \in A} a = q$.

To solve this problem, let $M[i, j]$ be a boolean-valued matrix (i.e., $M[i, j]$ is either *True* or *False*), with $i = 1, 2, \dots, n$ and $j = 0, 1, 2, \dots, B$. We will set $M[i, j] = \text{True}$ if and only if there is a subset of $\{x_1, x_2, \dots, x_i\}$ that sums to j .

- Show how to set $M[i, 0]$ for each $i = 1, 2, \dots, n$.
- Show how to set $M[i, j]$ given $M[i - 1, j - x_i]$ and $M[i - 1, j]$.
- Show how to find q (the solution to the problem above).
- Extra credit: show how to obtain the subset A giving that total value q .