EE 360C - ALGORITHMS
The University of Texas at Austin

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Problem 1: Summing Integers
Suppose you are given a collection $A = \{a_1, a_2, \ldots, a_n\}$ of n positive integers that add up to $2Z$. We want to design an $O(nZ)$ time algorithm to decide if the set can be partitioned into two groups B and $A - B$ such that:

$$\sum_{a_j \in B} a_j = \sum_{a_i \in (A-B)} a_i = Z,$$

in other words, there is a subset of A that adds up to Z.

(a) Define an $Z \times n$ array m, where $m[z, i]$ is 1 if there exists a subset of A, $\{a_1, a_2, ..., a_i\}$, that sums to z and 0 otherwise. Write the dynamic equation formula for computing $m[z, i]$.

(b) Write pseudocode that uses your dynamic equation formula to fill in the table m.

(c) In English, describe how you would reconstruct the solution from the table m (describe how you would return the actual subset of numbers that sums to Z instead of just “yes” or “no”).