Problem Set 3—Due Thursday, 15 July 1999

Problem 9. Consider the following EVEN-SPLIT problem: given a set S of N numbers, $S = \{a_1, \ldots, a_N\}$, partition it into two halves, T and $S - T$, such that the sum of the numbers in T is as close as possible to the sum of the numbers in $S - T$. That is, you want to minimize $|\sum_{i \in T} - \sum_{i \in S-T}|$. Use dyanmic programing to solve this problem. Make your algorithm as efficient as possible. Compute the running time of your algorithm. Then write a computer program to solve the the following instance:

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2837, 2742, 1992, 1999, 2108, 2123, 2652, 3214, 3367, 3855,
3912, 4115, 4188, 4723, 5623, 5777, 5909, 6000, 6108, 6756
```

Do you find the answer surprising? Explain.

You can find the numbers on http://www.cs.science.cmu.ac.th/personal/~rogaway/default.html; you don't have to type them in.

Problem 10. Let $x = x_1 \ldots x_n$ and $y = y_1 \ldots y_m$ be strings. We say that $z = z_1 \ldots z_{n+m}$ is a *shuffle* of x and y if z can be formed by interspersing the characters from x and y in a way that maintains the left-to-right ordering of the characters from each string. For example, `thhelerloe` is a shuffle of `hello` and `there`. Devise an algorithm that, given strings x, y and z, determines if z is a shuffle of x and y. Analyze your algorithm's running time. *Hint: the values in the table you construct can be Boolean.*