Uncle Mike has passed away and in his will has left a collection of valuable Pokémon cards to his two grandsons, Abe and Bob. The only direction in the will is to "divide the values of cards as evenly as possible". As the executor of Mike's will, you have priced each of the Pokémon cards to obtain an accurate monetary value. You are to decide how to divide up the Pokémon cards into two piles to minimize the difference in the sum of values of each pile.

For example, assume you have the following $n = 8$ Pokémon cards:

Card	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8
Value	2	1	3	1	5	2	3	4

After a lot of work, you figure out that you could divide the cards in the following way:

Abe	c_1, c_3, c_5	10
Bob	c_2, c_4, c_6, c_7, c_8	11

This gives \$10 worth of cards to Abe and \$11 worth of cards to Bob. Is this the best division? You job is to solve this problem generally for n cards where each card c_i has a positive integer value v_i. Your solution is to compute how the cards should be divided and the value of each pile. The input and output examples are as follows:

Input:
2 1 3 1 5 2 3 4
Output:
10
1 3 5
11
2 4 6 7 8

Now, you need to do the following tasks:

1. Solve this problem in a brute-force manner by checking all possible piles. Give an analysis for the time complexity of this brute-force algorithm and validate your analysis results by implementation and experiments. (30 marks)
2. Develop a more efficient algorithm by dynamic programming. You should first analyze this problem by the idea of dynamic programming and write the corresponding recursive property. You may also show the design of the array to store the intermedia results (markdown supports drawing tables). Give an analysis for the time complexity of this algorithm and validate your analysis results by implementation and experiments. The fastest one implementation in the class will get a bonus 10 marks for this miniproject. (70 marks)