

STA Online Computer Programming Contest (DWITE)
November 2003

Problem 4

Bin Packing

Your job is to pack up to 50 bins with boxes of candy. Each bin has a maximum capacity of 10 kilograms. You are to pack the boxes of candy into the minimum number of bins, starting with bin 1, then bin2, etc.

There are five different methods of bin packing that you are to try.

FIRST BIN (FB) - Pick the next box of candy, and put it into the first bin that it will fit in.

BEST BIN (BB) - Pick the next box of candy, and put it into a partially filled bin that will come closest to maximum capacity. If more than one bin comes equally as close to maximum capacity, then put it into the lowest numbered of those bins.

WORST BIN (WB) - Pick the next box of candy, and put it into a partially filled bin that is lightest. If more than one bin is equally light, then put it into the lowest numbered of those bins.

FIRST BIN ASCENDING (FBA) - Sort all of the boxes of candy, and picking them from lightest to heaviest, apply the **FIRST BIN (FB)** method.

FIRST BIN DESCENDING (FBD) - It is the same as **FIRST BIN ASCENDING (FBA)**, except pick the boxes of candy from heaviest to lightest.

For all five methods, the following two rules apply:

- 1 - only start a new bin when it is impossible to fit the box of candy into any bin that is already started
- 2 - a bin can never have more than 10 kilograms of boxes of candy.

The input file, DATA4, contains N lines of data, $2 \leq N \leq 250$, with the Nth line containing the value of zero. Lines 1 to N - 1 each contain a single positive integer, W, representing the weight of the boxes of candy. $1 \leq W \leq 10$.

The output file, OUT4, will contain five lines of data. Each line will represent one of the five different packing methods and the weight of the bins, with a non-zero weight, in order of bin number. Each output line will begin with the short form of the method in the following order FB, BB, WB, FBA and FBD. Each item on the line is separated by a single space.

<u>Sample Input</u>	<u>Sample Output</u>
1	FB 10 9 8 9 7
3	BB 10 9 8 9 7
5	WB 9 9 9 9 7
3	FBA 9 10 5 6 6 7
6	FBD 10 10 10 10 3
2	
1	
2	
4	
6	
3	
7	
0	