EE3980 Algorithms

Homework 10. Finding Equal Partitions

Due: May 20, 2018

Given a set of N integers, $A = \{a_i | 1 \le i \le N\}$, the objective of the homework is to find two disjoint sets S_0 and S_1 such that

$$S_0 \cap S_1 = \emptyset, \tag{10.1}$$

$$S_0 \cup S_1 = A, \tag{10.2}$$

$$\sum_{a_i \in S_0} a_i = \sum_{a_j \in S_1} a_j. \tag{10.3}$$

Your assignment is to write a `C` program to find a solution (S_0, S_1) as quick as possible, if such solution exists. If not, the program reports no solution possible. If successful, the program output should look like the following.

```
$ ./a.out < p1.dat
Solution: SUM(S0)=26 SUM(S1)=26
  A[1]=1 -> S0
  A[2]=5 -> S0
  A[3]=2 -> S0
  A[4]=5 -> S0
  A[5]=2 -> S1
  A[6]=9 -> S1
  A[7]=7 -> S0
  A[8]=9 -> S1
  A[9]=6 -> S0
  A[10]=6 -> S1
```

Six data files are provided for you to test your codes. They are `p1.dat`, `p2.dat`, `p3.dat`, `p4.dat`, `p5.dat`, and `p6.dat`. The first line of each file is the number of integers in the file, followed by integer data.

Though only one set of solution is needed, you should discuss the time needed to find all solutions.

Notes.

1. One executable and error-free `C` source file should be turned in. This source file should be named as `hw10.c`. Execution of the program is invoked by

   ```
   $ ./a.out < p1.dat
   ```

   And the output of the program is listed above.

2. A `pdf` file is also needed. This report file should be named as `hw10a.pdf`.

3. Submit your `hw10.c` and `hw10a.pdf` on EE workstations using the following command:

   $ $\sim$`ee3980/bin/submit hw10 hw10.c hw10a.pdf`

   where `hw10` indicates homework 10.

4. Your report should be clearly written such that I can understand it. The writing, including English grammar, is part of the grading criteria.