Computing Society of the Philippines

IBM. | event sponsor | **Philippine National Programming Contest 2010**
November 20, 2010 - Ateneo de Naga University - Naga City

Problem 04: The Philippine Style Party List System

Input from file: **prob04.in**
Output to console: **stdout** (in C), **cout** (in C++), **System.out** (in Java)
Execution time limit: **5 seconds**

The 1987 Philippine Constitution guarantees that twenty percent of the total number of members in the House of Representatives shall come from the party-list system.

On March 3, 1995, Fidel V. Ramos, as president of the Republic of the Philippines, signed into law Republic Act 7941 commonly known as the Party-List System Act. Republic Act 7941 defined the party-list system as a "mechanism of proportional representation in the election of representatives to the House of Representatives. ..." The first party-list election was held in 1998 and the Philippine-style Party-list election is held every three years hence. The party-list election on May 10, 2010 was the fifth of its kind. In the ballot, about 187 parties were listed but on May 21, 2010 the National Board of Canvassers for the Party-List System declared that only 175 of them were qualified to win a party-list seat for the House of Representatives.

In the first 3 party-list elections, the Commission on Elections (COMELEC) were using the 2-4-6 PERCENT RULE where a party with

- six percent of the total number of party-list votes (TPLV) or more will receive exactly three seats;
- at least four percent but less than six percent of the TPLV will receive exactly two seats;
- at least two percent but less than four percent of the TPLV will receive one seat only; and
- less than two percent of the TPLV will not be given a party-list seat.

In the 4th party-list election, the COMELEC used the CARPIO FORMULA or the FIRST PARTY RULE where all the parties with at least two percent of the TPLV (called the TwoPercenters) will receive one party-list seat each. Those parties will less than two percent of the TPLV will receive no seat. The additional number of seats to be given to the TwoPercenters is computed in the following manner:

- The party with the most number of votes will be determined. This is called as the Leading or First Party.
- If the First Party has six percent or more of the TPLV, it will receive two additional seats, and
    - If a TwoPercenter has the same number of votes as the First Party it will receive two additional seats,
    - If a TwoPercenter has at least fifty percent of the votes of the First Party, it will receive one additional seat only;
    - If a TwoPercenter has less than fifty percent of the votes of the First Party, it will not receive additional seat.
- If the First Party has at least four percent but less than six percent of the TPLV, it will receive

one additional seat only,

- o If a TwoPercenter has the same number of votes of the First Party it will receive one additional seat also,
- o The rest of the TwoPercenters will not receive any additional seat.
- If the First Party has at least two percent but less than four percent of the TPLV, it will not receive any additional seat. The other TwoPercenters will not receive any additional seat also.

In the 13th Congress (2007-2010), there were 219 congressional districts. Since the party-list representatives comprise twenty percent of the total number of members in the House of Representatives, the number of party-list seats is ¼ of the total number of congressional districts. Hence, the party-list in the 13th Congress was entitled to 219/4 = 54.75 or 54 party-list seats.

On 21 April 2009 the Supreme Court of the Philippines decided that the First Party Rule must be replaced and and the twenty-percent requirement shall be filled up. The new seat allocation formula which we shall call as the CARPIO Formula is given as follows:

1. First Round:
   1.1. The qualified parties shall be ranked from highest to lowest based on the percentage share of the total number of party-list votes they garnered during the party-list election.
   1.2. The TwoPercenters are entitled to one guaranteed seat each.

2. Second Round:
   2.1. The remaining number of seats is determined after the number of seats allocated in the first round is subtracted from the total number of party-list seats.
   2.2. The percentage of share of each TwoPercenter is multiplied by the remaining number of seats. The whole integer of the product corresponds to the number of additional seats of each two-percenters. If the whole integer is larger than two, only two additional seats are awarded to the said TwoPercenter.
   2.3. If there are still available seats to be distributed, then only those parties that do not receive any seats in 2.2. are entitled to one party-list seat. The first remaining seat is assigned to the highest ranking party that does not receive a seat in 2.2. The next ranking parties are assigned one seat each until all the remaining seats are exhausted.

Applying the CARPIO Formula on the May 14, 2007 Party-List election, we have the seat allocation as shown in the table below. Note that the TPLV was 15,337,808 and the available number of party-list seats was 54.

WINNING PARTIES AND SEATS WON USING THE CARPIO FORMULA ON PARTY LIST CANVASS REPORT NO. 33, MAY 14, 2007 PARTY-LIST ELECTION   (VOTES OF BATAS AND FPJM WERE NOT COUNTED DUE TO DISQUALIFICATION)

PARTY	VOTES Per PARTY	RANK	Percentage Over TPLV	1st Rd Seats	Percentage x Remaining Seats	2nd Rd Seats
TOTAL				17		37
BUHAY	1,169,338	1	7.623893%	1	2.820840	2
BAYAN MUNA	979,189	2	6.384152%	1	2.362136	2
CIBAC	755,735	3	4.927269%	1	1.823089	1
GABRIELA	621,266	4	4.050553%	1	1.498705	1
APEC	619,733	5	4.040558%	1	1.495006	1
A TEACHER	490,853	6	3.200281%	1	1.184104	1
AKBAYAN	466,448	7	3.041165%	1	1.125231	1
ALAGAD	423,165	8	2.758967%	1	1.020818	1
COOP-NATCCO	409,987	9	2.673048%	1	0.989028	1
BUTIL	409,168	10	2.667708%	1	0.987052	1
ARC	374,349	11	2.440694%	1	0.903057	1
ANAKPAWIS	370,323	12	2.414445%	1	0.893345	1
AMIN	347,527	13	2.265819%	1	0.838353	1
ABONO	340,002	14	2.216757%	1	0.820200	1
YACAP	331,623	15	2.162128%	1	0.799987	1
AGAP	328,814	16	2.143814%	1	0.793211	1
AN WARAY	321,516	17	2.096232%	1	0.775606	1
UNI-MAD	251,804	18	1.641721%			1
ABS	235,152	19	1.533153%			1
ALIF	229,267	20	1.494783%			1
KAKUSA	229,036	21	1.493277%			1
KABATAAN	228,700	22	1.491087%			1
ABA-AKO	219,363	23	1.430211%			1
SENIOR CITIZENS	213,095	24	1.389345%			1
AT	200,030	25	1.304163%			1
VFP	196,358	26	1.280222%			1
ANAD	188,573	27	1.229465%			1
BANAT	177,068	28	1.154454%			1
ANG KASANGGA	170,594	29	1.112245%			1
BANTAY	169,869	30	1.107518%			1
ABAKADA	166,897	31	1.088141%			1
1-UTAK	165,012	32	1.075851%			1
TUCP	162,678	33	1.060634%			1
COCOFED	156,007	34	1.017140%			1
AGHAM	146,062	35	0.952300%			1

With the CARPIO Formula on the 2004 Party-List Election, BAYAN MUNA with RANK 2 and 6.384152% of the TPLV received 3 seats while KABATAAN with RANK 22 and 1.491087% of TPLV won 1 party-list seat.

Let us consider Pi1, Pi2, ..., Pik, ST, v1, v2 , ..., vn where vj is the number of votes obtained by party Pj in a party-list election where the CARPIO Formula is used in the distribution of the ST party-list seats. The problem is to find the number of seats allocated to Pi1, Pi2, ..., Pik.

Input

We give two sample problems to illustrate the input specification.

```
2
PROBLEM_01: P04 P07 P09 18 1830 6186 6527 28813 1012 9112 1333 11881
9584 9838
PROBLEM_02:  P02 P05 14 1921 6277 6618 29804 1103 9203 1424 12872
9675 9929 1001 685
```

The number 2 on the first line means that there are two problems that follow. The next two lines are the data for the two problems.

PROBLEM_01 means that we are going to find the number of seats obtained by each of party **P04** with **28,813** votes, **P07** with **1,333** votes and **P09** with **9,584** votes where the total number of party-list seats to be allocated is **18**.

Output

For each problem **PROBLEM_XX**, print **OUTPUT_XX**, followed by colon, then space, then print the number of seats that will be allocated to each party list specified in the problem, separated by space, as shown below.

```
OUTPUT_01: 3 1 2
OUTPUT_02: 1 0
```