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**36th Annual High School Programming Contest**

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##### April 12, 2024

###### Gold Problem #5: Radical Ranking

Background Information:

There are numerous voting methods. The Plurality Method is the simplest. Each voter selects a candidate and the candidate that is selected the most wins. When there are only two candidates this method is not only simple but no one can argue with the results. A majority (> 50%) of the voters select a candidate.

What if there are four candidates? The Plurality Method is simple but suppose candidate A gets 10 votes, B gets 8 votes, C gets 6 votes, and D gets 4 votes. Perhaps A should win but suppose that A is the last choice for the 18 people who didn’t vote for A, and B is the second choice for the 20 people not voting for B as their first choice. A strong argument can be made that B should win the election.

If A is Pizza, B is Burgers, C is Chili, and D is Hot-Dogs, Burgers is the 1st or 2nd choice for all 28 voters. Plurality with Elimination, usually called Rank Choice Voting may be a better method for selecting a winner.

We’ll describe the Plurality with Elimination method with an example of four candidates and 33 voters.

With four candidates: A, B, C, and D, there are 24 different ways/combinations that a voter could mark a ballot. The combinations are listed in alphabetical order and numbered from 1 to 24. For our example, the number of voters selecting each of the 24 combinations is indicated in the last row.

**1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24**

A A A A A A B B B B B B C C C C C C D D D D D D

B B C C D D A A C C D D A A B B D D A A B B C C

C D B D B C C D A D A C B D A D A B B C A C A B

D C D B C B D C D A C A D B D A B A C B C A B A

**0 0 0 7 3 0 0 9 0 0 0 0 6 0 0 0 0 5 0 3 0 0 0 0**

This means that A has 10 first place votes, B has 9, C has 11, and D has 3 so candidate D is eliminated.

By removing D, the 33 voters now have ballots with one of six combinations for A, B, and C. We still show all 24 columns, first with the Ds removed

**1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24**

A A A A A A B B B B B B C C C C C C

B B C C A A C C A A B B A A B B C C

C B B C C A A C B A A B B C A C A B

C B C B C A C A B A B A C B C A B A

**0 0 0 7 3 0 0 9 0 0 0 0 6 0 0 0 0 5 0 3 0 0 0 0**

and then with the blank spaces removed:

**1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24**

A A A A A A B B B B B B C C C C C C A A B B C C

B B C C B C A A C C A C A A B B A B B C A C A B

C C B B C B C C A A C A B B A A B A C B C A B A

**0 0 0 7 3 0 0 9 0 0 0 0 6 0 0 0 0 5 0 3 0 0 0 0**

After D is eliminated A has 13 first place votes, B has 9, and C has 11 so candidate B is eliminated. We remove the Bs and then the blank spaces leaving us with

**1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24**

A A A A A A A A C C A C C C C C C C A A A C C C

C C C C C C C C A A C A A A A A A A C C C A A A

**0 0 0 7 3 0 0 9 0 0 0 0 6 0 0 0 0 5 0 3 0 0 0 0**

This leaves A with 22 first place votes and C with 11.

Write a program that inputs 24 integers, one for each of the 24 ballot combinations and outputs the winning candidate (A, B, C, or D) on one line along with the final number of first place votes on a second line.

NOTE-1: Assume that there will never be a tie to consider at any stage of the process.

NOTE-2: At each stage it’s possible that a candidate has secured a majority of the votes and will not be possible for this candidate to lose the majority and therefore the election. However, your program must complete the elimination process from four to two candidates in all cases.

Programming Problem:

Input:  On a single line, 24 positive integers each less than 100, separated by spaces.

Output: The election winner on one line followed by the final number of first place votes on the next line.

Example:

Input:

0 0 0 7 3 0 0 9 0 0 0 0 6 0 0 0 0 5 0 3 0 0 0 0

Output: A

22