

1994 ACM MID-CENTRAL REGIONAL PROGRAMMING CONTEST

Problem #5 - The Set's the Thing

Source File: `sets.{c|cpp|pas}`

Input File: `sets.in`

Output File: `sets.out`

The game of Set is played with a deck of 81 cards, each card having the following characteristics:

Symbol: *Diamonds, Ovals, or Squiggles*

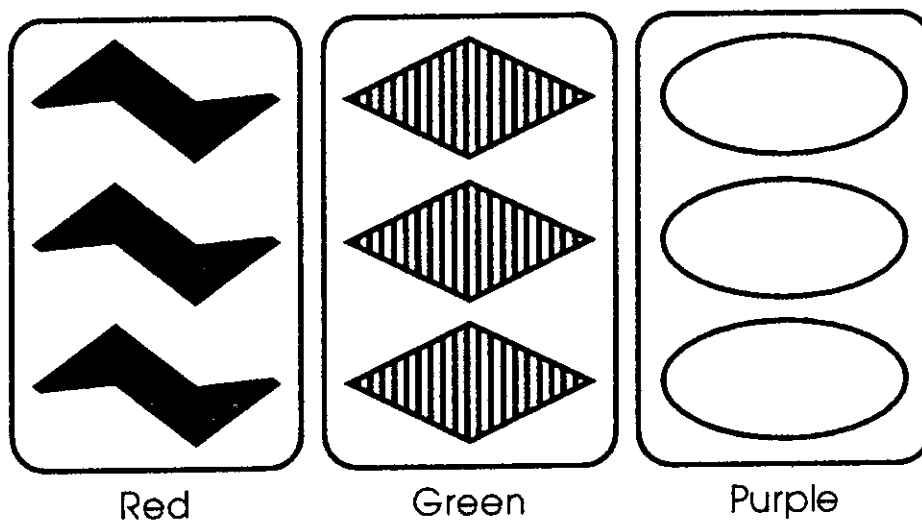
Count: *1, 2, or 3*

Color: *Red, Green, or Purple*

Shading: *Outlined, Filled, or Striped*

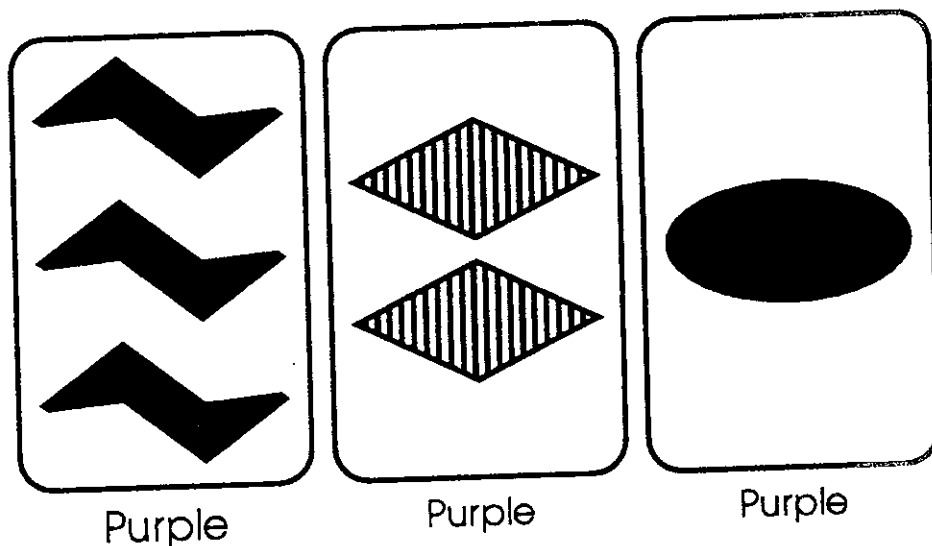
The cards are shuffled and a tableau of 12 cards is laid out. Players then attempt to be the first to identify "sets" (defined below) which exist in the tableau. Sets are removed as they are identified and new cards are dealt in their place. Play continues in this manner until all cards have been used. The winner is the player with the most sets.

A *set* is a collection of three cards in which each characteristic is either the same on all three cards or different on all three cards. For example, the cards shown below form a set.



To see how the above cards form a set, take each characteristic in turn. First, each card has a *different symbol*: the first card has squiggles, the second diamonds, and the third ovals. Second, each card has the *same count* of symbols; each has 3 symbols. Third, each card has a *different color*: the first is red, the second green, and the third purple. Finally, each card has *different shading*: the first is solid, the second striped, and the third outlined. So, each characteristic is either the same on all three cards or different on all three cards, satisfying the requirements for a set.

As an example of a three cards which *do not* form a set, consider the three cards shown below.



Again, take each characteristic in turn. Each card has a different symbol, each card has a different count of symbols, and each card is the same color. So far this satisfies the requirements for a set. When the shading characteristic is considered, however, two cards are filled and one card is striped. Thus, the shading on all three cards is neither all the same nor all different, and so these cards do not form a set.

The input for this program is several tableaux of cards. The tableaux are listed in the input file one card per line, with a single blank line between tableaux. The end of the input is marked by the end of the file (there is no blank line following the final tableau).

Each card in a tableau is specified by 4 consecutive characters on the input line. The first character identifies the type of symbol on the card, and will be either a 'D', 'O', or 'S', for Diamond, Oval, or Squiggle, respectively. The second character will be a '1', '2', or '3', identifying the number of symbols on the card. The third character identifies the color of the card and will be an 'R', 'G', or 'P', for Red, Green, or Purple, respectively. The final character indicates what type of shading is on the card and will be an 'O', 'F', or 'S', for Outlined, Filled, or Striped, respectively. All characters will be in upper case.

The output for the program is, for each set, a list of all possible sets which could be formed using cards in the tableau (it is possible that some cards may be used in more than one set).

Sample input file:

S1PS
D3P0
S2GF
02GS
02GF
03P0
S2RF
S3GS
D2GS
01GS
01GF
S2PS

02GF
01PF
D2P0
D3R0
S2P0
01GF
01GS
D2G0
S3PF
S2GF
D2GS
S1RS

The output for the above sample input should be:

CARDS: S1PS D3P0 S2GF 02GS 02GF 03P0 S2RF S3GS D2GS 01GS 01GF S2PS
SETS: 1. D3P0 S2RF 01GS
2. S3GS D2GS 01GS

CARDS: 02GF 01PF D2P0 D3R0 S2P0 01GF 01GS D2G0 S3PF S2GF D2GS S1RS
SETS: *** None Found ***