4295 - Videopoker

Europe - Northwestern - 2008/2009

Videopoker is the slot machine variant of the currently immensely popular game of poker. It is a variant on draw poker. In this game the player gets a hand consisting of five cards randomly drawn from a standard 52-card deck. From this hand, the player may discard any number of cards (between 0 and 5, inclusive), and change them for new cards randomly drawn from the remainder of the deck. After that, the hand is evaluated and the player is rewarded according to a payout structure. A common payout structure is as follows:

Hand	Payout
one pair	1
two pair	2
three of a kind	3
straight	4
flush	5
full house	10
four of a kind	25
straight flush	100
royal flush	250

Once you know the payout structure, you can determine for a given hand which cards you must change to maximize your expected reward. We'd like to know this expected reward, given a hand.

Input

On the first line one positive number: the number of testcases, at most 100. After that per testcase:

- One line with nine integers x_i ($0 \leq x_i \leq 1000$\$) describing the payout structure. The numbers are in increasing order and describe the payout for one pair, two pair, etc, until the royal flush.
- One line with one integer n ($1 \leq n \leq 10$): the number of starting hands to follow.
- n lines, each describing a starting hand. A hand consists of five space separated tokens of the form `Xs`, with `X` being the rank (`2' \dots `9', `T', `J', `Q', `K' or `A') and `s` being the suit (`c', `d', `h' or `s').

Output

Per testcase:

- One line for each starting hand with a floating point number that is the maximal expected reward for that hand. These numbers must have an absolute or relative error less than 10^{-6}.

Sample Input

```
1
1 2 3 4 5 10 25 100 250
5
Ah Ac Ad As 2s
Ks Qs Js Ts 2h
```

```
Ks Qs 2d 2h 3s
2d 4h 5d 3c 9c
2h 3h 6d 8h Tc
```

Sample Output

```
25.000000
8.9574468
1.5467160
0.9361702
0.6608135
```

The 2008 ACM Northwestern European Programming Contest

Northwestern 2008-2009