

Solitaire

Contrary to popular belief, solitaire is not only the game on your computer where you try to build up four stacks from Ace to King of the same suits, but instead, solitaire is simply a card game you play by yourself. There are many different versions out there using typical playing cards, like Klondike (the version I previously described), Freecell, Osmosis, and over 250 more that are publicized, as well as any kind of game you want to make up. This is one of those games. Take a deck of cards with random numbers on them. Shuffle the deck, and select a certain number of cards. Now arrange the cards in a single horizontal line that earns the least amount of points. Points are determined as follows: starting from the left, take the absolute value of the difference between the two cards, then multiply the result by the greatest common denominator of the two numbers. You sum up each adjacent pair of cards in this manner (excluding the final card, since it has no card to its right), and that is your total amount of points. Your goal is to implement the perfect player of this solitaire version, given a set of cards to play with.

Input

Input begins with a single number G , the number of games to play. Each game begins with a line with a single number C ($C \leq 18$), the number of cards that were selected. On each of the next C lines is a positive integer no greater than 1 billion.

Output

Output the numbers in the order that would yield the best score possible, separating each number with a single space. In the case of a tie, use the ordering that has the smallest number at its left, and if that is still a tie, use the ordering where the second card is smallest, and so on. After the cards are printed, print a " : " and then the score of the game.

Sample Input

```
2
5
4
1
3
5
2
3
10
10
1
```

Sample output

```
1 2 3 4 5 : 4
1 10 10 : 9
```