

# Vaults & Vampires

Grunkh, the brutal troll, defeated the good human mage Gregor McHexroy in a long and exhausting battle. Swords and clubs went into splinters, a forest burned down and even the mountain where all squirrels from the forest ran for shelter exploded during the epic battle. Nevertheless, Grunkh survived albeit badly injured. He collects all the gold McHexroy had in his pockets and trudges back to his cave to heal his wounds. Suddenly, a wild rat appears and dares to attack Grunkh, who is 10 times as big and 100 times as strong as the rat. Normally, this would be an easy fight, but now Grunkh is heavily injured and can barely move.

“I fought more than one hour to defeat this mage and now a rat tries to kill me and get all the loot? This is ridiculous, I need to find a new GM (game master)...” Lea thinks, who is playing Grunkh at the latest gathering of her friends testing the new RPG “Vaults & Vampires”. Nevertheless, she has to roll the dice now and see whether she can beat this tiny rat. At least, she wants to know the exact probability to win before she does so. Can you help her?

## Input

The first line of the input contains an integer  $t$ .  $t$  test cases follow.

Each test case consists of a line containing an integer  $n$  and a string  $x$ .  $n$  is the least number of points Lea has to get when rolling the dice and  $x$  is a string describing the dice. A set of  $a$  dice with  $b$  sides each (labelled 1 to  $b$  will be described as “ $adb$ ”. Multiple sets of dice may be concatenated by “+” signs.

## Output

For each test case, output one line containing “Case # $i$ :  $y$ ” where  $i$  is its number, starting at 1, and  $y$  is the probability to roll at least  $n$  points. The probability should be printed as a simplified rational number in the format “numerator/denominator”. Simplified means that the numerator and denominator should not have a common divisor bigger than one and should not be negative. 0 should always be printed as “0/1”.

## Constraints

- $1 \leq t \leq 20$
- $0 \leq n \leq 1000$
- There will be at most 50 dice with at least 3 and at most 20 sides each.

### Sample Input 1

```
3
3 1d6
15 1d6+2d20
75 25d6
```

### Sample Output 1

```
Case #1: 2/3
Case #2: 523/600
Case #3: 1478174426405911253/1579460446107205632
```

### Sample Input 2

```
10
212 8d12+17d18
234 6d14+15d6+6d14
427 13d17+3d10+16d17
54 5d15+8d4
310 43d8
74 9d17
77 31d5
132 15d16
494 6d18+28d14
196 43d5
```

## Sample Output 2

```
Case #1: 62699479497714892926960648553/117487744970306256455614857216
Case #2: 4168563295277/544012781953707046600704
Case #3: 535565468174301669569639698143/240984286053375457545705912611535848500
Case #4: 9133989493/12441600000
Case #5: 3919407348090459619163/340282366920938463463374607431768211456
Case #6: 4829553480/6975757441
Case #7: 4573872162525219139464/4656612873077392578125
Case #8: 29703508125433561/72057594037927936
Case #9: 45695/49996631340839995629278004951977558016
Case #10: 790906658013087/227373675443232059478759765625
```