MATH 6

MATH BATTLE

DECEMBER 17, 2017

1. A daisy has 12 petals. Two players are playing the following game: on his turm, each of them can pick either one or two petals (which must be next to each other). The player who picks the last petal wins. Is there a guarantted way to win for the first player? for the second one?

2. Find the remainder upon division by 99 of the following numbers: (a) 100 (b) $1000\ldots0$ (98 zeros) (c) $1000\ldots0$ (97 zeros) (d) $11\ldots11$ (99 ones) [Hint: $1111 = 1000 + 100 + 10 + 1$].

3. In a basket there are 30 bagels of two kinds: plain and poppyseed. It is known that if you select any 12 bagels, at least one of them will be poppyseed, and among any 20, at least one will be plain. How many bagels of each kind can there be in the basket?

4. A father had 5 sons. He left them a bag of gold coins and following will:

the first son should get half of all the coins plus half a coin
the second son should get half of all the remaining coins plus half a coin
$\vdots$
the last son should get half of all remaining coins and half a coin

After the sons carried his instructions, each of them got his coins, they never needed to cut a coin in halfs, and no coins were left. Can you determine how many coins the father left his sons?