MATH 6: HOMEWORK 23

ODD AND EVEN

1. In a certain country the parliament has 400 members. After voting for a certain bill, the chairman announced that the bill was approved: there were 27 more votes in favor of the bill than against. The opposition claims that the voting results were falsified. Why? [All 400 parliament members voted, and there were no abstainers.]

2. A bag of 300 hundred gold coins has only coins with values of 1, 3, 5 and 15 piastres. The note on the bag says that the total is 1001 piastres. Can it be correct?

3. The numbers 1 through 100 are written on the blackboard in a row, with spaces left between them. Alan and Sasha are playing the following game: on his turn, each player puts either + or - between two numbers. After all signs are written (so they get something like 1 + 23 + 4 + 56 . . . ), the total is computed. If it is even, Alan wins; if it is odd, Sasha. What is the best strategy for Alan? Should he take the first turn or leave the first turn to Sasha?

4. A grasshopper is jumping along the number line: the first jump is 1 cm long, the second one, 2 cm, and so on. Can he return to his starting position after 9 jumps? 10 jumps? 2026 jumps?

5. The numbers 1 through 6 are written on the board. You can add 1 to two of the numbers. By repeating this many times, can you make all numbers equal?

6. Can you connect 1011 computers with cables so that each computer is connected to exactly 3 other ones? [Hint: how many cables would you need?], how about 2026 computers?

7. A train consists of a locomotive and five cars marked I, II, III, IV and V. In how many ways can you rearrange cars, in such a way that car I is always closer to the locomotive than car II?