Parity

In mathematics, **parity** is the property of an integer of whether it is even or odd.

Fill in this table (O stands for Odd, E stands for Even).

E + E =	**E – E =**	**E × E =**	**E × O × … × O × … × O =**
E + O =	**E – O =**	**E × O =**	**O × O × … × O × … × O =**
O + O =	**O – O =**	**O × O =**	**O + O + … + O + … + O =**

Problem 1

Fill in the results for the division:

O ÷ E =	**E ÷ O =**
O ÷ O =	**E ÷ E =**

Problem 2.

Can the sum of three integers be even, but the product of the same three integers be odd?

Problem 3.

The difference of two integers is multiplied by their product.
Could you get this number *11011811061018224521543*?

Problem 4.

Ev writes one whole number on the board, and Od writes another. If the product is even, Ev is declared the winner; if it is odd, then Od is declared the winner.
Can one of the players play in such a way as to definitely win?

Problem 5.

Represent each of the numbers 1101 and –1101 as a) 2n + 1; b) 2n – 1; c) 2n + 333.

Problem 6.

Numbers from 1 to 10 are written in a row. Is it possible to place “+” and “–” signs between them so that the value of the resulting expression is equal to zero?

Problem 7.

On 99 cards, write the numbers 1, 2, ..., 99, mix them, lay them out with their blank sides up and write the numbers 1, 2, ..., 99 again. For each card, add up its two numbers and multiply the 99 resulting sums. Prove that the result is even.

Problem 8.

Is it possible to erase one of the given a) 2024; b) 2025 integers so that the sum of the remaining numbers is even?