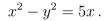
Problem 1. Determine all pairs of integers (x, y) which satisfy the equation



Problem 2. Determine all prime numbers *p* for which the number



is also a prime number.

Problem 3. Let *ABC* be a triangle, *D* the midpoint of *AB* and *E* a point on *BC* such that BE = 2EC. If $\angle CDA = \angle BAE$, prove that $\angle BAC = 90^{\circ}$.

Problem 4. Alice and Bob construct a 2023-digit number as follows: The digits are chosen consecutively from left to right with Bob choosing every third digit and Alice choosing all other digits.

E.g. for the number

 $\overline{a_1a_2a_3\cdots a_{2023}}$

Alice chose firstly the digits a_1, a_2 , then Bob chose the digit a_3 , then Alice chose the digits a_4, a_5 e.t.c.

Alice wins if the number is a multiple of k, otherwise Bob wins. Determine which of the two players has a winning strategy in the following cases:

- (a) k = 11
- (b) k = 15