Problem 1. Solve the equation $\log_x(x+2) = 2$.

Problem 2. Solve the inequality:
$$0.5^{|x|} > 0.5^{x^2}.$$

Problem 3. The integers from 1 to 2015 are written on the blackboard. Two randomly chosen numbers are erased and replaced by their differense giving a sequence with one less number. This process is repeated until there is only one number remaining. Is the remaining number even or odd? Justify your answer.

Problem 4. Four circles are constructed with the sides of a convex quadrilateral as the diameters. Does there exist a point inside the quadrilateral that is not inside the circles? Justify your answer.

Problem 5. Prove that for any finite sequence of digits there exists an integer the square of which begins with that sequence.

Problem 6. The distance from the point P to two vertices A and B of an equilateral triangle are $|PA| = 2$ and $|PB| = 3$. Find the greatest possible value of $|PC|$.