Problem 1. Solve the equation $3^x + 9^x = 27^x$.

Problem 2. An equilateral triangle in inscribed in a circle of area $1m^2$. Then the second circle is inscribed in the triangle. Find the radius of the second circle.

Problem 3. Solve the inequality:
$2\sqrt{x^2 - 5x + 4} + 3\sqrt{x^2 + 2x - 3} \geq 5\sqrt{6 - x - x^2}$.

Problem 4. Peter and John played a game. Peter wrote on a blackboard all integers from 1 to 18 and offered John to choose 8 different integers from this list. To win the game John had to choose 8 integers such that among them the difference between any two is either less than 7 or greater than 11. Can John win the game? Justify your answer.

Problem 5. Prove that given 100 different positive integers such that none of them is a multiple of 100, it is always possible to choose several of them such that the last two digits of their sum are zeros.

Problem 6. Given 100 different squares such that the sum of their areas equals $1/2\ m^2$, is it possible to place them on a square board with area $1\ m^2$ without overlays? Justify your answer.