Problem 1
For what values of $b$ do the equations: $1988x^2 + bx + 8891 = 0$ and $8891x^2 + bx + 1988 = 0$ have a common root?

Problem 2
A house is in the shape of a triangle, perimeter $P$ metres and area $A$ square metres. The garden consists of all the land within 5 metres of the house. How much land do the garden and house together occupy?

Problem 3
Suppose that $S$ is a finite set of at least five points in the plane; some are coloured red, the others are coloured blue. No subset of three or more similarly coloured points is collinear. Show that there is a triangle
(i) whose vertices are all the same colour,
(ii) at least one side of the triangle does not contain a point of the opposite colour.

Problem 4
Let $x_{n+1} = 4x_n - x_{n-1}$, $x_0 = 0$, $x_1 = 1$, and $y_{n+1} = 4y_n - y_{n-1}$, $y_0 = 1$, $y_1 = 2$. Show for all $n \geq 0$ that $y_n^{2} = 3x_n^{2} + 1$.

Problem 5
Let $S = \{a_1, a_2, \ldots, a_r\}$ denote a sequence of integers. For each non-empty subsequence $A$ of $S$, we define $p(A)$ to be the product of all the integers in $A$. Let $m(S)$ be the arithmetic average of $p(A)$ over all non-empty subsets $A$ of $S$. If $m(S) = 13$ and if $m(S \cup \{a_{r+1}\}) = 49$ for some positive integer $a_{r+1}$, determine the values of $a_1, a_2, \ldots, a_r$ and $a_{r+1}$.