

Youngstown State University
Department of Mathematics
Fall 2003

Problem Solving Seminar 2

1. Show that if n is an integer such that both $2n + 1$ and $3n + 1$ are both squares, then n is divisible by 40.
2. Each of the points of a plane are colored red or blue. Show that at least one of the colors has the property that it contains points of any distance.
3. The integers from 1 to 100 are written in a 10×10 table. From each row we select the third largest number. Show that the sum of these numbers is larger than the sum of the numbers in one of the rows.
4. Let $f(x) = x^2 + ax + b \cos x$. Find all values of a and b such that the equations $f(x) = 0$ and $f(f(x)) = 0$ have the same nonempty set of zeros.
5. Find the point X that minimizes the sum of the squares of the distances from the vertices of a $\triangle ABC$.