# Problems from mathematical contests

1. **Manhattan Mathematical Olympiad 2003**
   Prove that from any set of one hundred integers, one can choose either one number which is divisible by 100, or several numbers whose sum is divisible by 100.

2. **Japan 1997** Prove that among any ten points located on a circle with diameter 5, there exist at least two at a distance less than 2 from each other.

3. **IMO 1959** Prove that the fraction $\frac{21n+4}{14n+3}$ is irreducible for every natural number $n$.

4. **IMO 1981** Determine the maximum value of $m^2+n^2$, where $m$ and $n$ are integers in the range $1, 2, \ldots, 1981$ satisfying

$$(n^2 - mn - m^2)^2 = 1\,.$$

   This last problem is quite difficult: the aim is that you look at its solution `https://artofproblemsolving.com/wiki/index.php?title=1981_IMO_Problems/Problem_3` and write it in full details.

ANY QUESTION? JUST ASK!