MCI Module 10, Session 38
Conducted by IISER Bhopal, June 23, 2023

1. Aahana is standing in front of a building which has (countably) infinite floors. As she tries to enter the building, the security guard tells her that due to repair and maintenance work being done, if she uses the stairs, she has to climb exactly M number of floors (not more, not less) and if she uses the elevator, she can climb exactly N number of floors, with $M < N$. Being mathematically inclined, Aahana calculates that she cannot reach the 58th floor and thirty four other floors by using such a combination of stairs and the elevator. Can you figure out what M and N are?

2. There are n points $p_1, \ldots, p_n$ in the plane such that not all of them lie on the same straight line. Compute the smallest number of straight lines required to join all possible pairs of points p_i and p_j where $i \neq j$.