**1. Show that if *n*+1 distinct integers are chosen from the set {1, 2, …, 3*n*}, then there are always two which differ by at most 2.**

answer: we choose all number from set which differ by equals 3,so the number of there is 3n/3 = n. Then we choose an arbitrary integer from the rest integers of set, which will differ by the adjacent integers at most 2.

**2.** **Prove that of any five points chosen within a square of side length 1, there are two whose distance apart is at most *.***

answer: we divide the square into four square of side length , so the furthest distance in the square of side length is ***.*** .According to pigeonhole principle, there are at least two points in a square, so there are two whose distance apart is at most ***.***

**3. In a room there are 10 people with integer ages [1, 60]. Prove that we can always find two groups of people (with no common person) the sum of whose ages is the same.**