Permutation & Combination

Date Planned : __ / __ / __	Daily Tutorial Sheet – 13	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 3 ▶	Exact Duration :_____

222. Find the number of all rational number $\dfrac{m}{n}$ such that $(m, n \in Z)$

    (i) $0 < \dfrac{m}{n} < 1$ **(ii)**   G.C.D $(m, n) = 1$ **(iii)** $mn = (25)!$

223. Let $A = \{0, 5, 10, 15, \ldots\ldots, 195\}$. Let B be a subset of A with atleast 15 elements. Show that B has two distinct elements whose sum is divisible by 15.

224. In any set of 181 square integers, prove that one can always find a subset of 19 numbers. The sum of whose elements is divisible by 19.

225. Prove that in each year, the 13th day of some month occurs a Friday.

(Don't dread Friday, the 13th)

226. Consider n (> 1) lotus leaves placed around a circle. A frog jumps from one leaf to another in the following manner. It starts from some leaf. From there, it skips exactly one leaf in the clockwise direction and jumps to the next one. Then it skips exactly two leaves in the clockwise direction and jumps to the next one. Then it skips three leaves again in the clockwise direction and jumps to the next one, and so on.

Suppose it turns out that if the frog continues this way, then all the leaves are visited by the frog sometime or the other. Show that n can-not be odd.

227. In a badminton singles tournament, each player plays against all others exactly once and each game had a winner. After all the games, each player listed the name of all the players she defeated as well as the names of all the players defeated by the players defeated by her. For instance, if A defeats B and B defeats C, then in the list of A: B, C is included. Prove that at least one player listed all the names.