Permutation & Combination

Date Planned : __ / __ / __	Daily Tutorial Sheet – 15	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 3	Exact Duration :_____

234. Suppose $A_1, A_2, \ldots, A_{20}$ is a 20-sides polygon. How many non-isosceles triangles can be formed whose vertices are the vertices of the polygon but whose sides are not the sides of the polygon?

235. The number 3 can be written as sum of positive integers in four ways, viz, 3, 2 + 1, 1 + 2, 1 + 1 + 1. Show that any positive integers n can be so expressed in 2^{n-1} ways.

236. What is the minimum number of pairwise comparisons needed to identity the heaviest and second heaviest of 128 objects?

237. Give a combinatorial proof for:

$$\binom{n}{k}\binom{n+2}{k} \le \binom{n+1}{k}^2$$

238. We call a permutation $(x_1, x_2, \ldots, x_{2n})$ of the numbers 1, 2, ..., $2n$ pleasant if $|x_i - x_{i+1}| = n$ for at least one $i \in \{1, 2, \ldots, 2n-1\}$. Prove that atleast one-half of all the permutation are pleasant for each positive integer n.

239. Find the number of ways to split an n-day semester into three parts, choose any number of holidays in the first part, an odd number of holidays in the second part, and an even number of holidays in the third part.