LATTICE DIAGRAM AND DYCK PATH CONSTRUCTION OF LENGTH K – UPSTROKES AND K – DOWNSTROKES FROM (0,0) TO (2K,0) AND DYCK PATH CHANGING TO 2 – COLORED MOTZKIN PATH AND SCHRÖDER PATH

Abstract

This research discusses about one application of the Catalan numbers which is how to calculate the number of strategies for someone in choosing a travel route from (0,0) to (n,n) using one unit step to the right or above. This is known as the Lattice path. If the Lattice path changes into diagonal path, then the generated path is called as the Dyck path. Moreover, the Dyck path with k – upstrokes and k – downstrokes from (0,0) to (2k,0) also can be changed into 2 – colored Motzkin path and Schroder path. We also prove that the Catalan numbers can be alternatively defined as follow : $C_n = \dfrac{1}{n}\dbinom{2n}{n+1}; n \geq 1$ or $2\dbinom{2n}{n} - \dbinom{2n+1}{n}$ for n $\geq$ 0.