Answer on Question #52428 – Math – Graph Theory

Let Kn be such that vertices are labeled 1,2,3....n. number of simple paths between v1 and vn such that the labels on the paths are strictly increasing

a) 2^n

b) 2^n-2

c) (n-2)!

d) n!

Solution

$$\binom{n^2/2}{m} \tag{A}$$

The number of simple graphs of n vertices and 0, 1, 2, ..., $n^2/2$ edges are obtained by substituting 0, 1, 2, ..., $n^2/2$ for m in (A). The sum of all such numbers is the number of all simple graphs with n vertices. Therefore the total number of simple, labeled graphs of n vertices is

$$\binom{n^2/2}{0}+\binom{n^2/2}{1}+\binom{n^2/2}{2}+\ldots+\binom{n^2/2}{n^2}=2^{n^2/2}=2^n$$

Answer: a) 2^n