

HW#40How many paths from $(0,0) \rightarrow (6,6)$ are there such that

- a) Path on or below diagonal

b) Path on or above diagonal

c) Has @ least one point above & one point below diagonal

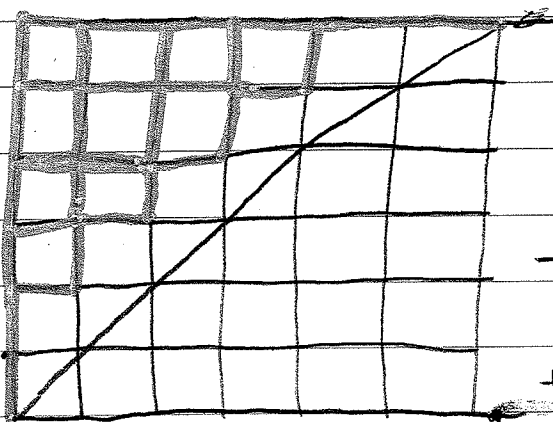
d) Path strictly above diagonal (except $(0,0)$ & $(6,6)$)a & b) These are the same # due to symmetry of a square. & is equal to C_6

$$C_6 = \frac{1}{7} \binom{12}{6} = 132$$

c) This is total paths less only upper paths, less only lower paths.

$$\binom{12}{6} - 2 \cdot \frac{1}{7} \binom{12}{6} = \binom{12}{6} \left(\frac{5}{7} \right) = 660$$

d)



Note: vertical & horizontal lines touching diagonal are off limits. I highlighted the still "in play" path lines

- These lines make up the upper diagonal of a 5×5 square grid & the # of paths traversing this is C_5

$$C_5 = \binom{10}{5} \frac{1}{6} = \cancel{105} 42$$

So the answer is $\frac{42}{2} = 21$ paths strictly above diagonal.