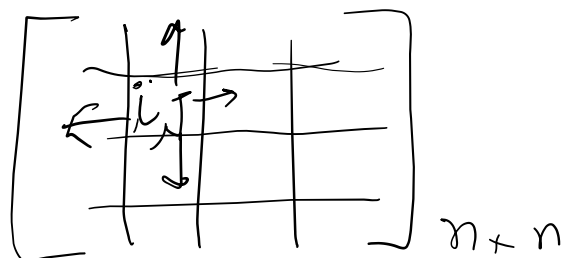
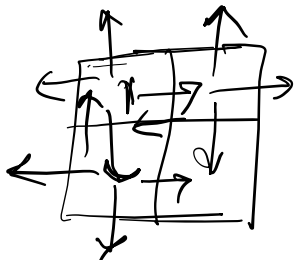


Problem1: a square matrix $n \times n$. A person is at position (i, j) and can move along axis in any direction in one step. Calculate the number of paths he can take from (i, j) in n steps.



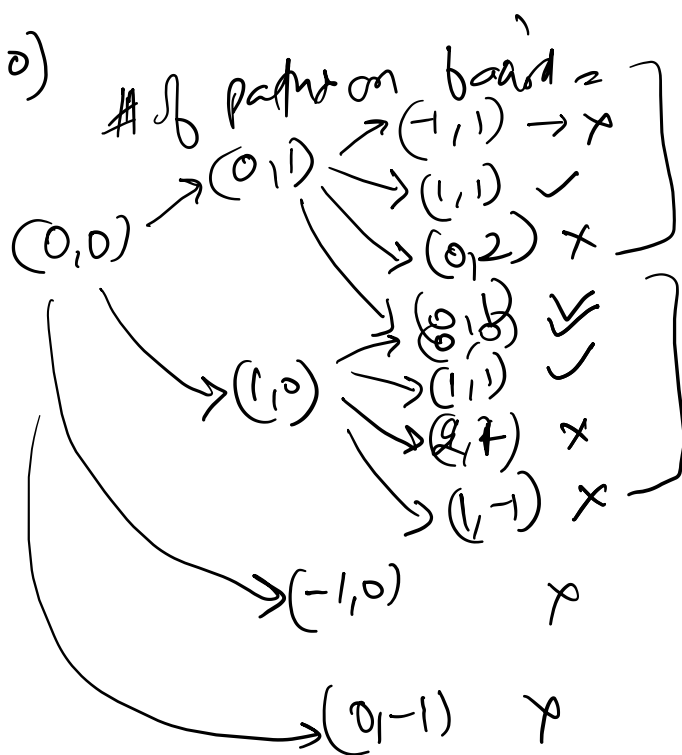
$$f(n, i, j) = f(n-1, i+1, j) + f(n-1, i, j-1) + f(n-1, i-1, j) + f(n-1, i, j+1)$$

But total number of paths will be more than $f(n)$

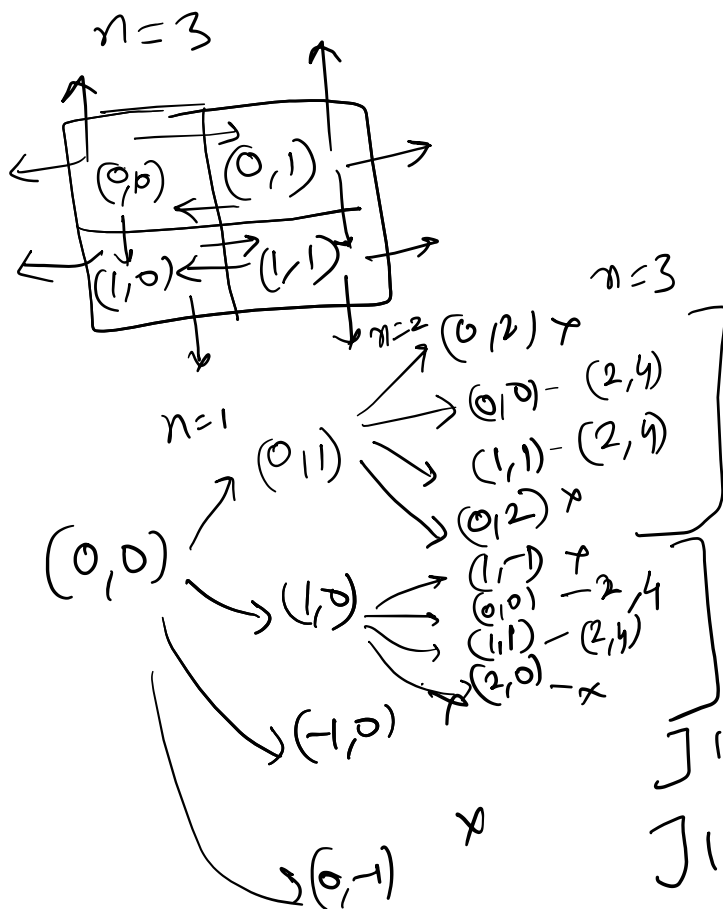


$n=2$

at $(0,0)$



$$\text{prob} = \frac{4}{10} = \frac{2}{5}$$



$$2+2=4$$

$$4+4+1+1=10$$

$$4+4=8$$

$$10+10+1+1=22$$

$$2+2=4$$

$$4+4+1+1=10$$

∴ recursion is

$$f(k, i, j) = f(k-1, i-1, j) + f(k-1, i, j-1) + f(k-1, i+1, j) + f(k-1, i, j+1)$$

$$g(k, i, j) = g(k-1, i-1, j) + g(k-1, i, j-1) + g(k-1, i+1, j) + g(k-1, i, j+1)$$

f : path on board

g : total path

for n path at 0 = $\frac{f(n)}{g(n)}$ ✓