Q. There are N coins numbered from 1, 2, 3.... N. The coins are biased. You have tossed all N coins. Find the probability of having more heads than tails.

$N = 3$

$N < 3 \times 10^3$

$p_{hi} = [0.3, 0.6, 0.8]$

ans → 0.612

probability of more heads than tails.

⇒ How many heads are atleast reqd?

$\left(\frac{n}{2}+1\right)$ → coins with head

N=3

HHH

HHT

HTH

THH

$0.3 \times 0.6 \times 0.8$

$0.3 \times 0.6 \times (1-0.8)$

$0.3 \times (1-0.6) \times 0.8$

$(1-0.3)(0.6)(0.8)$

Sum

$$f(i,j) = p_i * f(i-1, j-1) + (1-p_i) f(i-1, j)$$

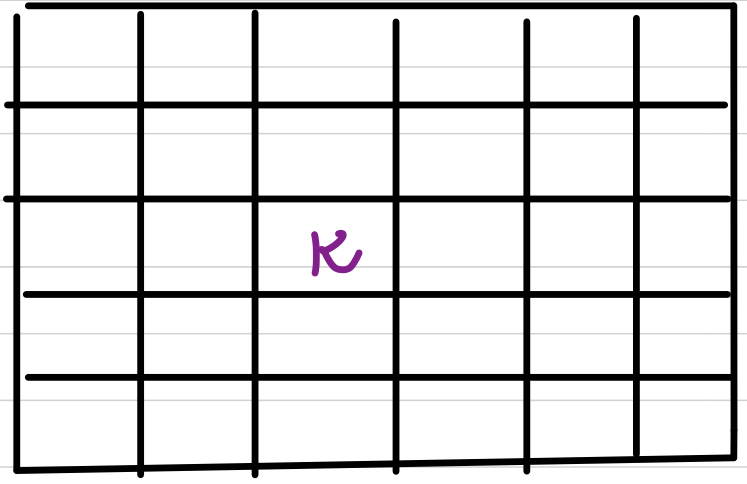
On tossing i coins, probability of getting atleast j heads.

if we get heads on the i^{th} coin

if we get tails on the i^{th} coin.

$f(N, \frac{N}{2}+1)$ ans

Knight Probability



$f(i,j,k) = \sum \frac{1}{8} * f(i+d_i, j+d_j, k-1)$

↳ $f_{i,j}$

$f(i,j,k)$

↓

probability that

Knight remains

inside the board

after k moves

starting from (i,j)

$d_i = -1, -2, -1, -2$

$d_j = +2, +1, -2, -1$

Q:) Bad luck island

Rocks → R paper - P
Scissor → S

Survival of rock.

$$f_r(r,s,p) = \begin{cases} \frac{r \times p}{rp+sp+rs} \times f_r(r-1,s,p) + \\ \frac{rs}{rp+sp+rs} \times f_r(r,s-1,p) + \\ \frac{sp}{rp+sp+rs} \times f_r(r,s,p-1) \end{cases}$$

↓
probability of rock survival

$(r==0 \text{ or } s==0) \rightarrow 0.0$

$(p==0) \rightarrow 1.0$

$$f_S(r,s,p) = \begin{cases} \frac{r \times p}{rp+sp+rs} \times f_r(r-1,s,p) + \\ \frac{r\,s}{rp+sp+rs} \times f_r(r,s-1,p) \\ \frac{sp}{rp+sp+rs} \times f_r(r,s,p-1) \end{cases}$$

$\swarrow$

Probability of Scissor Survival

$(S == 0 \text{ or } P == 0) \rightarrow 0.0$

$r == 0 \rightarrow 1.0$

$$fp(r,s,p) = \begin{cases} \frac{r \times p}{rp+sp+rs} \times fp(r-1,s,p) \\ + \\ \frac{r\,s}{rp+sp+rs} \times fp(r,s-1,p) \\ + \\ \frac{s\,p}{rp+sp+rs} \times fp(r,s,p-1) \end{cases}$$

Probab of Paper Survival

$(p == 0 \text{ or } r == 0) \rightarrow 0.0$

$s == \infty \rightarrow 1.0$