The two miners, honest and selfish miners play a repeated round of mining the blocks.In each mining round ,let us assume the honest miner wins with probability p and losses the block mining reward with probability q=(1-p).Let us find the probability that the honest miner wins N rewards starting with ‘n’ block rewards in hand.

To start with the honest miner has a reward of ‘i’,when he participates in the block mining process.

The next immediate outcome is Pi=pPi+1+qP­i-1  -(1)

So the miner gets the next reward with Pi+1 or loses it with Pi-1

The added sum on the rightside of (1) will yield the result of 1,since p+q=1.So taking p+q on left hand side

1= pPi+1+qP­i-1  -(2)

Pi­(p+q)= pPi+1+qP­i-1  -(3)

Pi+1=

Pi+1­-Pi=

If i=2,then

Then P2-P1===, since P0=0, the end state of complete ruin.

If i=3

P3-P2= =)=)2 P1

Pi+1-Pi=)i P1 , 0<i<N

therefore

Pi+1-P1 =- Pk )=)k P1

Pi+1= P1+)k

By using geometric series

Pi+1=P1