COIN TOSS GAME

Gambler A and Gambler B

$n+1$ coins n coins

try to look for chances to apply symmetry

Let's say A and B both have n coins

$P(A>B) = P(A<B) = x$ (E_1, E_3)

$P(A=B) = y$ (E_2)

$2x+y=1$

When we add $n+1$ coins

E_1: Same chance x

E_3: Same chance, A won't have more than B (x)

E_2: differs $\rightarrow$ $0.5y$

$A>B$ if A is Heads on $(n+1)^{th}$

$$x+0.5y$$
$$= x+0.5(1-2x)$$
$$= 0.5$$