Problem 4

Consider pA = "page chosen by Anis", pG = "page chosen by Gianl"

We know that $pA \neq pG$,

Assume that N is the total ~~#~~ of pages in the book

We take $M = \frac{N}{2}$ if N is even, $M = \frac{N+1}{2}$ if it is odd.

Let's assume ~~it~~ N even so $M = \frac{N}{2}$

Now we can ask both Anis and Gianluca their page with probability ~~of~~ $\frac{1}{2}$

Assume that we choose Gianluca which reveals his pG ~~without knowing which~~ The strategy is:

<u>case 1</u>, $(pA < pG)$ so Anis has earlier page

if $pG > M$ then we ~~t~~ have to choose Anis for earlier page, guessing ~~incorrectly~~ correctly

if $pG \leq M$ then we choose Gianluca incorrectly.

$$Pr(pG > M) = \frac{N-M}{N-1} = \frac{N/2}{N-1}$$

, $N-1$ because pG is selected from all ~~pa~~ N pages except pA that for ipothesis is different.

<u>case 2</u> $(pA > pG)$

if $pG > M$ we have to choose Anis, guessing incorrectly

if $pG \leq M$ we have to choose Gianluca, guessing correctly

$$Pr(pG \leq M) = \frac{N-M}{N-1} = \frac{N/2}{N-1}$$

So the overall probability of the game is, ~~by knowing with~~

$$Pr(\text{game}) = \frac{1}{2}\left(\frac{N/2}{N-1}\right) + \frac{1}{2}\left(\frac{N/2}{N-1}\right) = \frac{N/2}{N-1} = \frac{N}{2(N-1)}$$

that is bigger than $\frac{1}{2}$

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