# Re: A card game probability

***Source:*** http://sci.tech−archive.net/Archive/sci.math/2007−01/msg06081.html


- *From*: "Faton Berisha" <fberisha@xxxxxxxxxx>


- *Date*: 26 Jan 2007 08:09:11 −0800


On Jan 26, 4:15 pm, matt271829−n...@xxxxxxxxxxx wrote:

> On Jan 26, 11:42 am, "Faton Berisha" <fberi...@xxxxxxxxxx> wrote:
>
> > On Jan 25, 9:25 pm, "jsepp...@xxxxxxxxx" <jsepp...@xxxxxxxxx> wrote:
>
> > > Take a card deck with 52 cards. Pick cards one by one and
> > > compute the
> > > cards by ace, two, three,..., jack, queen, king, ace,..., king,
> > > ace,
> > > ..., king, ace, ..., king. What is the probability that at least
> > > once
> > > you turn a card of the same value as you say aloud?
>
> > The probability that you turn the first card of the same value as one
> > of the n cards turned before exactly in your (n+1)−st trial is
>
> > p_n = 3n/(52−n) prod_{j=1}^{n−1}(1−3j/(52−j)).
>
> > Hence, the probability that you turn such a card in n trials is
>
> > sum_{j=1}^{n−1} p_j.Can you explain what this has to do with the problem
> > posed? What is the
>
> value of n supposed to be? What answer do you get from this formula? I
> would expect the correct answer to be approximately 1 − (12/13)^52.
> This would be the answer if all the probabilities were independent
> (which of course they aren't).

OK, lets formulate the problem as I understood it:

You draw cards from a 52 cards deck until you draw two cards of a same value. We consider that each card has a positive integer value in the range 1,...,13.

Obviously, you cannot do it on your first draw ("trial"), hence p_0=0.

The probability of drawing such a card in your second trial is p_1=3 times 1 / (52−1).

Now, probability that you don't do it in your second and do it in the third trial (i.e. you turn a card whose value is equal to one of the two cards already flipped) is

p_2 = 3 times 2/ (52−2)(1 − 3 times 1/ (52−1)),

and so forth, with p_n being the probability for drawing the first such card in the n−th trial.

The sum p_1+p_2+...+p_n gives the probability to draw at least one such card in n trials.

Now, when I read your message, and again the original question, it seems to me too that what the poster meant was to find the probability of drawing at least once a card with a value (n−1) mod 13 + 1, where n is the number of the trial. It is, of course, a completely different problem.

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