Assignment 7

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Question Q. 1. "Flush" in card game

Answer Q. 1.

Consider if you discard the 2 clubs, then only the 3 hearts remain. Therefore, the only possible flush is a hearts flush consists of 5 hearts.
Hence the possibility of getting a flush is equal to that of getting 2 hearts from the remaining 47 cards, which is given by:

$$10/47 \times 9/46 = 0.0416 \tag{1}$$

Question Q. 2. Birthday problem

Answer Q. 2.

Let such probability be P, number of required people be n.
Consider the birthday of such person i be D_i, where $1 \leq D_i \leq 365$
Let's specify the "specific person" to be the first one, hence having birthday D_1
For $D_2, D_3, \ldots, D_n \neq D_1$ not equal to D_1, there are $365 - 1$ choices out of 365 days
The possibility of $D_2, D_3, \ldots, D_n \neq D_1$ should hence be given by:

$$\left(\frac{364}{365}\right)^{n-1} \tag{2}$$

Hence the possibility of any one of $D_2, D_3, \ldots, D_n$ is equal to D_1, which is P, is given by:

$$1 - \left(\frac{364}{365}\right)^{n-1} \tag{3}$$

By solving $P > 0.5$, we have

$$n > 253.652 \tag{4}$$

Hence the minimum n is 254