Elementary Probabilities

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Exercise 1:

Jacques says to Paul: "if I have a one in six chance of getting a six by rolling a die, then I double my chances by rolling it twice". Is Jacques right? Why?

(Construct a probabilistic model and translate the question asked in terms of calculating the probability of an event.)

Exercise 2:

The Prince of Tuscany once asked Galileo: why when throwing 2 dice do we get the sum 7 more often than the sum 6, although these two sums are obtained in three different ways?

(Same indication.)

Exercise 3:

In a group of n people, what is the probability that the birthdays of at least two of them fall on the same day? From how many people does this probability exceed 1/2? (We do not take leap years into account.)

Exercise 4:

In a pack of chocolates, there are 50 chocolates, of which 20 are fruit jellies, 20 are dark chocolate and 10 are milk chocolate. I randomly draw 4 chocolates. What is the probability of having 2 milk chocolate chocolates? On average, how many milk chocolates will I draw?