Probability Calculus 2019/2020, Homework 2 (three problems)

Name and Surname ..... Student's number .....

In the problems below, please use the following: as k ***– the sum of digits in your student's number; as*** m ***– the sum of the two largest digits in your student's number; and as*** n ***– the smallest digit in your student's number plus 1. For example, if an index number is*** 609999***:*** $k = 42$***,*** $m = 18$***,*** $n = 1$***.***
Please write down the solutions (transformations, substitutions etc.), and additionally provide the final answer in the space specified (the answer should be a number in decimal notation, rounded to four digits).

3. A lottery was organized and two boxes with lottery tickets were installed. There were k tickets, among which $n + 3$ were winning, in each of the boxes. Prior to the start of the lottery, n tickets (chosen randomly) were moved from the first box to the second box. We draw one ticket from the second box. Calculate the probability that it will be a winning ticket.

ANSWER:

Solution:

4. On any given day, Bob has either a good day (with probability $\frac{k}{k+1}$) or a bad day (with probability $\frac{1}{k+1}$), just like his brother John, for whom these probabilities amount to $\frac{k}{k+5}$ and $\frac{5}{k+5}$, respectively. Before football practice, John made the following offer to Bob: if Bob hits the goal crossbar (at least) 2 times in $n+3$ trials, John will stand him ice cream. Bob would like to change the offer – to ice cream for at least one hit of the crossbar. John will agree if he has a good day. Knowing that Bob hits the crossbar with probability depending on whether he has a good day or not ($\frac{1}{m-3}$ if it's good and $\frac{1}{m+3}$ if it's bad), find the probability that he will get ice cream.

ANSWER:

Solution:

5. A chess player has to play three games of chess with three increasingly demanding opponents, with whom he usually wins with probabilities $k/(2k+2)$, $m/(m+20)$ and $n/(n+8)$, respectively. If he wins a game, his self-confidence rises and his chances of winning the next game rise twofold. Calculate the probability that the chess player did not win the first two games if we know that he won the third game.

ANSWER:

Solution: