Probability Calculus 2018/2019, Homework 5 (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).

11. Let X be a random variable from a distribution with a CDF equal to

$$F(t) = \begin{cases} 0 & \text{if } t < -n, \\ \frac{n}{k} & \text{if } -n \leq t < 0, \\ \frac{(n+1)(t+1)}{k} & \text{if } 0 \leq t < \frac{m}{n+1} - 1, \\ 1 & \text{if } t \geq \frac{m}{n+1} - 1. \end{cases}$$

Calculate $\mathbb{P}(X < 0)$ and $\mathbb{P}((n+1)X^3 - mX^2 < 0)$.

ANSWER: $\mathbb{P}(X < 0) =$ $\mathbb{P}((n+1)X^3 - mX^2 < 0) =$

Solution:

12. There are two white, k black and m green balls in a box. We draw three balls, without replacement. Let X denote the number of white balls among the three balls drawn. Calculate $\mathbb{E}(2X + 1)$.

ANSWER:

Solution:

13. Let X be a random variable from a distribution with density

$$g(x) = ne^{-n(x-m)}\mathbb{1}_{[m,\infty)}(x).$$

Find the quantile of rank m/k of variable X.

ANSWER:

Solution: