Mathematical Statistics 2018/2019, Homework 3

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. Let $X_1, X_2, \ldots, X_5$ be a sample from a distribution with density

$$f_\theta(x) = \begin{cases} \frac{\theta}{mk^{\theta/m}} x^{\theta/m-1} & x \in [0,k] \\ 0 & \text{otherwise} \end{cases},$$

where $\theta > 0$ is an unknown parameter.

Calculate the values of the Method of Quantiles Estimator of θ (using the median) and the Maximum Likelihood Estimator of θ for a sample consisting of the following observations: $X_1 = 1$, $X_2 = 2$, $X_2 = 3$, $X_4 = 4$, $X_5 = 5n$, .

ANSWER: $\hat{\theta}_{ML} =$ $\hat{\theta}_{MQ} =$

Solution: