Mathematical Statistics 2020/2021, Homework 6 (Two 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. A group of k students were surveyed regarding the amount of time they devote to work during their summer break. Assuming that the time spent (in hours) follows a normal distribution with mean μ and variance equal to m^2, where $\mu > 0$ is an unknown parameter, we want to verify the null hypothesis that $\mu = 3k$ hours, against the alternative that it is more. What is the critical region of a $\frac{m+n}{2}\%$ significance level test for these hypotheses? What is the value of the appropriate test statistic, if the sample average was equal to $3k + 2n$? What is the p-value of this result? What is the decision?

ANSWER:

Critical region of the test:	Value of test statistic:	p-value of test statistic:	Reject null? (YES/NO):

Solution:

12. The price levels of hostel beds were studied in four summer resorts. Basic characteristics for the collected data are summarized in the table below:

sample stats \ city	A	B	C	D
average price (in dollars, per bed)	$k + 3n$	k	$k - 3n$	$k + 1$
variance of price (unbiased estimator)	$k^2 - 3m$	$k^2 - 3m$	$k^2 - 2m$	$k^2 - 2m$
sample size	$2m$	$40n - k$	k	$2m$

Assuming that the prices in different cities are independent and follow normal distributions with unknown means and a common variance, verify the hypothesis that the average price levels in the four cities are equal, for a significance level $\alpha = 0.1$.

ANSWER:

Critical value
for the test:

Value of
test statistic:

Reject null?
(YES/NO):

Solution: