Probability Calculus 2018/2019, Homework 11 (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).

29. There are $2m+n$ workers in a bank, Mr. Smith is one of them. Each day, the headquarters randomly choose m individuals to work in the customer service area. Using the de Moivre-Laplace theorem, approximate the probability that during 100 consecutive days, Mr. Smith will spend at most $2k$ days in the customer service area.

The answer should be provided as $\Phi(t)$, where Φ is the CDF of the standard normal distribution. Next, the value of the CDF should be obtained from distribution tables. Both t and the value of the CDF should be provided as numbers in decimal form, rounded to 4 digits.

ANSWER: $\Phi\Big($..................................$\Big) \approx$ ....

Solution:

30. There are $n+3$ large cities in a country: M_1, M_2, M_3, …, M_{n+3}. A businessman travels between these cities. Each morning, he randomly chooses a city that he is going to travel to on that day; in particular, he may also remain in the city where he is on a given morning. Each choice has the same probability, choices on different days are independent. On the first day, the businessman arrives by plane from abroad to a randomly chosen city (again, each city has the same probability). Using the Central Limit Theorem, approximate the probability that during 100 subsequent days, the total number of days spent in cities M_1 and M_2 will be larger than the total number of days spent in city M_3 by at least m.

The answer should be provided as $\Phi(t)$, where Φ is the CDF of the standard normal distribution. Next, the value of the CDF should be obtained from distribution tables. Both t and the value of the CDF should be provided as numbers in decimal form, rounded to 4 digits.

ANSWER: $\Phi\Big(\ldots\ldots\ldots\ldots\Big) \approx \ldots\ldots\ldots\ldots$

Solution: