

Probability Calculus 2019/2020, Homework 6 (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).

15. Let X be a random variable from a distribution with density $g(x) = \frac{1}{2}n \sin(nx) \mathbb{1}_{[0, \pi/n]}(x)$. Calculate $\mathbb{E}(\sin(mX/2) + k)$.

Hint: $\sin \alpha \sin \beta = \frac{1}{2} [\cos(\alpha - \beta) - \cos(\alpha + \beta)]$.

ANSWER:

Solution:

16. Let X be a random variable from a distribution with a CDF

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

Calculate $\mathbb{E}(kX^{1/2} - m)$.

ANSWER:

Solution:

17. km individuals, among whom there are persons A and B , queue randomly in a sequence. Find the expected value of the number of individuals standing between A and B .

ANSWER:

Solution: