

Probability Calculus 2018/2019, Homework 8 (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).

20. Let (X, Y) be a random vector from a distribution such that

$$\mathbb{P}\left((X, Y) = (a, b)\right) = \frac{(a - m + 1)n + b}{9(2n + k + 1)}, \quad a \in \{m, m + 1, m + 2\}, \quad b \in \{k, k + 1, k + 2\}.$$

Find $\mathbb{P}(X = m)$ and $\mathbb{E}Y$.

ANSWER:

$\mathbb{P}(X = m) =$	$\mathbb{E}Y =$
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Solution:

21. Let (X, Y) be a random vector with density $g(x, y) = Cx^{k/m}\mathbf{1}_{\{0 \leq x \leq y \leq n\}}$. Find C and $\mathbb{E}XY$.

ANSWER:

$C =$

$\mathbb{E}XY =$

Solution:

22. Let (X, Y) be a two-dimensional normal random vector, such that $\text{Var } X = k$, $\text{Var } Y = m$ and variables $nX + mY$ and X are independent. Calculate the variance of random variable $kX + mY + n$.

ANSWER:

Solution: