SEMEN KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS

Educational level: first (bachelor)

Term 1

Educational discipline: Higher Mathematics in International Business

Examination paper (EXAMPLE)

Task 1. **(6 points)** The depositor paid UAH 20,000 to the bank. The annual interest charged by the bank is 5%. Calculate the total profit the depositor will have if you save money in the bank for 5 years in the following cases: a) the depositor annually withdraws funds that are accrued by interest; b) the depositor does not withdraw money within 5 years, i.e. interest capitalization occurs.

Task 2. **(8 points)** **a)** Solve the systems using Jordan-Gauss method and check its solution using a substitution:

$$\begin{cases} 2x_1 - 3x_2 + 2x_3 = 6 \\ x_1 - x_2 - 3x_3 = -5 \\ -x_1 - 4x_2 + x_3 = 1 \end{cases}$$

b) Write down the general equation of a straight line that passes through the points (-2, 3) and (1,6).

Task 3. **(8 points)** **a)** In a certain assembly plant three machines make 25%, 45% and 30%, respectively, of the products. It is known from past experience that 4%, 2,5% and 3% of the products made by each machine, respectively, are defective. Now, suppose that a finished product is randomly selected. 1) What is the probability that if is standard? 2) What is the probability that this product was made by the third machine?

b) Find the derivative of the function: $y = (x^5 + 8)^6$

Task 4 (8 points). a) The probability of finding a mistake on a book page is equal to 0.001. 3000 pages are checked. Find the probability that there is a mistake at 4 pages.

b) The continuous statistical series is given in the table:

$[x_i, x_{i+1}]$	5 - 11	11 - 17	17 - 23	23 -29	29 - 35
m_i	5	8	23	9	5

1) Find the mean ($\bar{x}_s$), the variance (S_x^2) and the root-mean-square deviation (S_x) for this sample. 2) Find the confidence interval for the population mean with the probability $P = 0{,}95$.

Task 5 (10 points). Empirical data are given as:

X	1	1,5	2	2,5	3
Y	2,15	2,3	2,6	2,8	2,5

a) Construct a pair linear equation of a regression: $\hat{y}_x = b_0 + b_1 x$ and make an analysis of coefficients. b) Plot the graph of this regression and mark empirical data. c) Calculate a correlation coefficient *r*, a determination coefficient R^2, an elasticity coefficient and explain obtained results.

It was approved at the meeting of the department of Economic and mathematical modelling
Protocol № 9 from December 20, 2024

The chief of the department L. Malyarets

The lecturer Ie. Misiura