

Yerevan State University
Master's Program Entrance Examination
EXAMINATION TICKET

Faculty: Faculty of Economics and Management

Specialization: Data Science in Business

1. Calculate the integral:

$$\int x^2 \sin(x) dx$$

/4 points/

2. Given the matrix

$$A = \begin{pmatrix} 0 & -1 \\ 2 & 3 \end{pmatrix}$$

/4 points/

i) Find the characteristic polynomial and eigenvalues of matrix A .

ii) Find the eigenvalues and eigenvectors of matrix A .

3. Last year, 12% of the organization's customers stopped using its services. This year, after implementing new customer management practices, only 100 out of 1000 customers stopped using the services. Is it possible, at a 5% significance level, to claim that the new methods have improved the results?

- Formulate the statistical hypothesis described in the problem. /1 point/
 - Perform the calculations and test the hypothesis. /3 points/
 - Interpret the obtained result. /1 point/
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4. 1% of a city's population is infected with a new virus. The government has acquired tests that give a "negative" result to healthy individuals with 90% probability and a "positive" result with 10% probability, while infected individuals receive a "positive" result with 100% probability. A randomly selected patient tests "positive." Find the probability that the patient is actually infected.

/5 points/

5. Concepts of revenue and profit. Profit maximization. Relationship between them.

/2 points/