

Kyiv School of Economics
Admission Exam in Mathematics
Summer 2018

General instructions (read carefully!):

- You should NOT open the exam before your proctor says so.
- The exam has 10 problems. All problems will be weighted equally.
- You have 80 minutes for this exam.
- The answer to each problem is a number or a short expression. Write down your answers in the Answer sheet. However, please, provide, in the exam book, detailed explanations of how the answers have been attained.
 - In the case of a wrong answer, a partial credit may be given based on your explanations.
 - Please, write legibly (readably).
 - Cheating on any exam automatically invalidates all your admission tests!
- You can use the back of any page for your draft notes.

YOUR NAME _____

Answer Sheet

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

1. Evaluate the following integral

$$\int_0^{\infty} (x^2 - x)e^{-x} dx$$

2. Find the inverse of the following matrix:

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 2 & 2 & 0 \end{bmatrix}$$

3. Compute

$$\lim_{n \rightarrow \infty} \left(1 - \frac{1}{n}\right)^n$$

4. Compute

$$\lim_{x \rightarrow 0} \frac{\log(1+x)}{2x}$$

5. Find the derivative of the function

$$f(x) = \frac{x^3}{x^2 + 1}$$

6. A committee of 3 people is to be formed randomly from a group of 4 women and 2 men. Find the probability that the committee has 3 women.

7. Consider a chocolate manufacturing company which produces only two types of chocolate – A and B. Both the chocolates require Milk and Choco only. To manufacture each unit of A and B, following quantities are required:

Each unit of A requires 1 unit of Milk and 3 units of Choco

Each unit of B requires 1 unit of Milk and 2 units of Choco

The company kitchen has a total of 5 units of Milk and 12 units of Choco.

On each sale, the company makes a profit of

5 hryvnias per unit A sold

6 hryvnias per unit B sold.

Now, the company wishes to maximize its profit. How many units of A and B should it produce respectively?

8. Evaluate the following integral:

$$\int_4^5 \frac{5}{(x-3)(x+2)} dx$$

9. Evaluate the following integral:

$$\int_0^2 \frac{x^2}{x^3 + 1} dx$$

10. In a school, 60% of pupils have access to the internet at home. A group of 3 students is chosen at random. Find the probability that exactly 2 have access to the internet.

Extra page