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USE OF PEDAGOGICAL TECHNOLOGY IN EXPLANATION OF THE GAUSS, GAUSS-JORDAN METHOD OF SOLVING THE SYSTEM OF LINEAR EQUATIONS

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Abstract

Education is the most important and reliable method of systematic education. Education is a unique cognitive process controlled by a teacher. It is the leadership role of the teacher that ensures the full mastery of knowledge, skills and abilities by students, and the development of their mental strength and creative abilities. The article also gives suggestions and recommendations regarding the methodical importance of cognitive ability formation in the teaching of specific sciences.

Keywords: education, recommendation, student, analysis, method, linear equation, system, Gauss method, root.

Абстрактный

Воспитание – самый важный и надежный метод систематического воспитания. Обучение – это уникальный познавательный процесс, управляемый учителем. Именно лидерская роль преподавателя обеспечивает полное овладение учащимися знаниями, умениями и навыками, развитие их умственных сил и творческих способностей. Также в статье даются предложения и рекомендации относительно методической значимости формирования познавательных способностей при преподавании конкретных наук.

Ключевые слова: образование, рекомендация, студент, анализ, метод, линейное уравнение, система, метод Гаусса, корень.

The transition to a modern, social, oriented market economy is the main basis of the reforms implemented in developed countries. In this process, the introduction of innovative approaches to teaching and modular teaching technology, which is its component, is of great importance in the higher education system. It is today's demand to be aware of and know how to use modular technologies in the formation of education and personal development, as well as in the implementation of pedagogical technology.

Special researches are being conducted in our republic on creating a methodical system of teaching mathematical subjects in higher educational institutions and using modular technology, theoretical justification of training projects and their practical use.

The important part of designing educational activities is that the pedagogue and students acquire knowledge, skills and competencies in designing.

State educational standards, educational standards, which determine the necessary requirements for the quality of high professional training, qualification, cultural and moral level of learners and aim to raise the quality of education to the level of world requirements. a new generation of plan and science programs has been developed. An educational system was formed based on the educational process based on new innovative technologies.

In this article, the solution of the system of linear equations using the Gaussian method, the application of the system of linear equations in life problems is studied. Cramer's formulas play an important role in the theory of systems of linear equations. However, in practical exercises, the process of solving the system using this method requires a lot of calculations. Therefore, the Gaussian method is often used in practice. The essence of this method is that the unknowns are successively eliminated and solved by bringing them to a "stepped" or "triangular" system equivalent to the given system.

1)
$$\begin{cases} a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n = b_1 \\ a_{21}x_1 + a_{22}x_2 + \ldots + a_{2n}x_n = b_2 \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ a_{m1}x_1 + a_{m2}x_2 + \ldots + a_{mn}x_n = b_m \end{cases} \quad (1$$

2) It is required to solve a system of m equations with n unknowns. Let any coefficient in this system be different from zero, for example, a11≠0. If a11=0, then by replacing the positions of the equations, we get a11≠0 in the new system.

3) Except for the first equation in the system, we eliminate x1 from the remaining equations. To do this, divide the first equation by the coefficient a11≠0
$$\begin{cases} x_1 + \frac{a_{12}}{a_{11}}x_2 + \ldots + \frac{a_{1k}}{a_{11}}x_k + \ldots + \frac{a_{1n}}{a_{11}}x_n = \frac{b_1}{a_{11}}, \\ a_{11}x_1 + a_{22}x_2 + \ldots + a_{2k}x_k + \ldots + a_{1n}x_n = b_2, \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ a_{i1}x_1 + a_{i2}x_2 + \ldots + a_{ik}x_k + \ldots + a_{in}x_n = b_k, \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ a_{m1}x_1 + a_{m2}x_2 + \ldots + a_{mk}x_k + \ldots + a_{mn}x_n = b_m \end{cases} \quad (2)$$

we create a system. This is equivalent to the given system. Now multiply both sides of the first equation by -a21 and add it to the second equation. Then, we multiply the first equation by a31 and add it to the third equation, and so on. As a result, this system, which is as strong as (1), is given

$$\begin{cases} x_1 + a'_{12}x_2 + \ldots + a'_{1k}x_k + \ldots + a'_{1n}x_n = b'_1, \\ \quad a'_{22}x_2 + \ldots + a'_{2k}x_k + \ldots + a'_{2n}x_n = b'_2, \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \quad a'_{i2}x_2 + \ldots + a'_{ik}x_k + \ldots + a'_{in}x_n = b'_i, \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \quad a'_{m2}x_2 + \ldots + a'_{mk}x_k + \ldots + a'_{mn}x_n = b'_m \end{cases} \qquad (3)$$

we form the equation

$$a'_{1k} = \frac{a_{1k}}{a_{11}}, \qquad b_1 = \frac{b_1}{a_{11}}, \qquad a'_{ik} = a_{ik} - \frac{a_{1k}}{a_{11}}a_{i1}, \quad b'_i = b_i - \frac{b_1}{a_{11}}a_{i1},$$ (i=2,3,...,m; k=2,3,...,n)

Now, if n in the second equation of (3) is different from zero, we divide the equation by . Then, we add it to the third, fourth, etc. equations by multiplying them accordingly. If, during this process, the coefficients in front of all the unknowns on the left side of an equation in the system are equal to zero, and the free term remains different from zero, then the process of finding the solution of the system ends, because the solution of this system does not exist. Therefore, the given system is not mutually exclusive.

If the system is a joint system, then we form one of the following systems from system (1):

$$\begin{cases} x_1 + \tilde{a}_{12}x_2 + \ldots + \tilde{a}_{1p}x_p + \ldots + \tilde{a}_{1k}x_k + \ldots + a_{1n}x_n = \tilde{b}_1, \\ \qquad x_2 + \ldots + \tilde{a}_{2p}x_p + \ldots + \tilde{a}_{2k}x_k + \ldots + \tilde{a}_{2n}x_n = \tilde{b}_2, \\ \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \qquad\qquad x_p + \ldots + \tilde{a}_{pk}x_k + \ldots + a_{pn}x_n = \tilde{b}_p \end{cases} \qquad (4)$$

(p<n, ya'ni tenglamalar soni noma'lumlar sonidan kam)

yoki

$$\begin{cases} x_1 + \tilde{a}_{12}x_2 + \ldots + \tilde{a}_{1k}x_k + \ldots + a_{1n}x_n = \tilde{b}_1, \\ \qquad x_2 + \ldots + \tilde{a}_{2k}x_k + \ldots + \tilde{a}_{2n}x_n = \tilde{b}_2, \\ \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \qquad\qquad x_k + \ldots + \tilde{a}_{kn}x_n = \tilde{b}_k, \\ \qquad\qquad \ldots\ldots\ldots\ldots \\ \qquad\qquad\qquad x_n = \tilde{b}_n \end{cases} \qquad (5)$$

System (4) is called a step system, and system (5) is called a triangular system.

If the system of linear equations has the form (5), we find from the last equation, then we find the value of xn-1 by putting the value of in the previous equation, and

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so on. As a result, it follows that the system of linear equations (1) has a unique solution.
If the given system of linear equations (1) comes to the step-like system (4) using elementary substitutions, it follows that the given system has infinitely many solutions. In fact, in system (4), we transfer the unknown terms to the right and form the following system:

$$\begin{cases} x_1 + \tilde{a}_{12}x_2 + \ldots + \tilde{a}_{1p}x_p = \tilde{b}_1 - \tilde{a}_{1p+1}x_{p+1} - \ldots - \tilde{a}_{1n}x_n, \\ \qquad x_2 + \ldots + \tilde{a}_{2p}x_p = \tilde{b}_2 - \tilde{a}_{2p+1}x_{p+1} - \ldots - \tilde{a}_{2n}x_n, \\ \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \qquad\qquad x_p = \tilde{b}_p - \tilde{a}_{pp+1}x_{p+1} - \ldots - \tilde{a}_{pn}x_n \end{cases}$$

In this case, we create a triangular system by assigning arbitrary values to the free unknowns consisting of , and then we determine the unknowns in a row using the above method. If we take into account the possibility of assigning arbitrary values to , then the given system has infinitely many solutions. That is, the system will be indeterminate.

4) Example 1. This

5)

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

let's solve the system by Gaussian method. Divide the first equation by a11=2

$$\begin{cases} x_1 + 0,5x_2 - 0,5x_3 = 0,5, \\ 3x_1 + 2x_2 - 2x_3 = 1, \\ x_1 - x_2 + 2x_3 = 5. \end{cases}$$

we come to the system. First we multiply the first equation by -3 and add it to the second equation, then we multiply it by -1 and add it to the third equation, then

$$\begin{cases} x_1 + 0,5x_2 - 0,5x_3 = 0,5, \\ \quad 0,5x_2 - 0,5x_3 = -0,5, \\ \quad -1,5x_2 + 2,5x_3 = 4,5. \end{cases}$$

is formed. From this, o $\begin{cases} x_1 + 0,5x_2 - 0,5x_3 = 0,5, \\ \quad x_2 - \quad x_3 = -1, \\ \quad -1,5x_2 + 2,5x_3 = 4,5. \end{cases}$

Now, multiply both sides of the second equation by +1.5 and add the third equation, where

$$\begin{cases} x_1 + 0,5x_2 - 0,5x_3 = 0,5, \\ \qquad x_2 - \quad x_3 = -1, \\ \qquad\qquad x_3 = 3. \end{cases}$$

will be. From these, x1=1, x2=2, x3=3 are found. So, the system has a common and unique solution.

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