Information technology on the study of mathematics bachelors nonmathematical specialties

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Abstract: The teacher of mathematics should have a holistic view of mathematics as a science, its place in the modern world and in the sciences. Possess the knowledge system of the theoretical foundations of computer science. Know of a computer, computer architecture trends. Have the skills to build several procedural - problem - and object-oriented technology. Have computer skills, with various auxiliary devices with system and application software for general use. For example, in this Information and Technology developed world to use an interactive whiteboard, projector, laptop beeches, tablet, etc. Knowledge of the potential use of computer technology in the management of educational institutions and the informatization of the educational process.
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Introduction

The effectiveness of the modernization of higher education depends on the factors and conditions that focused on the perception of the quality of spare capacity highly Competence - nonmathematician professional context. And since, giving the weight of time spent in higher education for the organization of all forms of the lesson, all the increases, the efficiency subject, in the end, will significantly influence the quality kompetent - Context Format training specialist training nonmathematician. Relevance of the topic is also conditioned by the fact that the current system of higher education must meet European standards in the context of the Bologna process of preparing high competent nonmathematician specialist capable of professional self-improvement and self-development, has the information - cognition competence - learning context format that would allow future Professional experts actively use their information - cognitive competence to progressive - creative self [1 - 9].

Introduction of information computer technology in education is an urgent and objective necessity, because our education system must meet the requirements of the modern information society. It's no secret that our training has long captured the intricacies of information technology, and the problem of teacher - to keep up with them [10]. Just learn to work on modern technology, we can meet the requirements of modern times.

The use of information computer technology in education suggests that the teacher should be able to:

- process text, numeric, graphic and audio information with the appropriate processors and editors to prepare teaching materials in order to apply them to the study of mathematics;
- create slides for teaching material, using the editor MS Power Point presentations and display on the study of mathematics;
- use existing shelf software products in their subject;
- to search for relevant information on the Internet in preparation for lessons and extra-curricular activities;
- Develop and conduct tests with help of computer testing for example: AD-tester, plotonus etc.

Consider a lecture on the topic, see "The determinants, matrices, and its properties. The system of linear equations "theme of the lecture, for this is the slides and the slides. Try to use the information computer technology in the learning process that is by considering the topic: "A system of two linear equations with two unknowns." Prepare slides for class [11]:

$$\begin{cases} a_{11}x + a_{12}y = b_1 \\ a_{21}x + a_{22}y = b_2 \end{cases} \quad (1)$$

To solve the system eliminate the first variable x, then y. To do this, multiply the first equation by a22, and the second by -a12, and add it to the equation:

$$(a_{11}a_{22} - a_{12}a_{21})x = b_1a_{22} - b_2a_{12}$$

Similarly, eliminate the variable x from (1), we have:

$$(a_{11}a_{22} - a_{12}a_{21})y = a_{11}b_2 - b_1a_{21}$$

From these equations we find x and y:

$$x = \frac{b_1a_{22} - b_2a_{12}}{a_{11}a_{22} - a_{12}a_{21}}, \quad y = \frac{a_{11}b_2 - b_1a_{21}}{a_{11}a_{22} - a_{12}a_{21}}$$

$$a_{11}a_{22} - a_{12}a_{21}, b_1a_{22} - b_2a_{12}, a_{11}b_2 - b_1a_{21}$$

Expression is the determinant of the second order. To denote the determinant of the symbol:

$$a_{11}a_{22} - a_{12}a_{21} = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$$

Ie determinant of the second order is a number written as a square table numbers:

$$\Delta = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} \quad (2)$$

The numbers $a_{11}, a_{12}, a_{21}, a_{22}$ are called the elements of the determinant, the elements form the principal diagonal determinant elements a_{11}, a_{22} - secondary diagonal. a_{12}, a_{21}

According to the above notation:

$$b_1a_{22} - b_2a_{12} = \begin{vmatrix} b_1 & a_{12} \\ b_2 & a_{22} \end{vmatrix} = \Delta x$$

$$a_{11}b_2 - b_1a_{21} = \begin{vmatrix} a_{11} & b_1 \\ a_{21} & b_2 \end{vmatrix} = \Delta y$$

Then [12] takes the form:

$$x = \frac{\Delta x}{\Delta}, \quad y = \frac{\Delta y}{\Delta} \quad (3)$$

Determinant of the coefficients of the unknowns of the system (2) is the main determinant of the system, the determinant of Δx is obtained from the main determinant by replacing elements of the first column by the column of free terms, and Δy - Replace the second column by the column of free terms.

(3) are called Cramer's rule for solving a system of two linear equations with two unknowns.

Determinant of the third order is a number written as a square table

$$\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

Elements a_{11}, a_{22}, a_{33} form the principal diagonal determinant elements $a_{13}, a_{22}a_{31}$ - secondary diagonal.

Minor elementa a_{ij} opredelitelya third order is the determinant of the second order, obtained by deleting the i-th row and j-th column. Minor denoted Mij. For example:

$$M_{21} = \begin{vmatrix} a_{12} & a_{13} \\ a_{32} & a_{33} \end{vmatrix}$$

Cofactor Aij element aij is defined by: $A_{ij} = (-1)^{i+j} M_{ij}$. For example, the cofactor of a21 and a33ravny:

$$A_{21} = (-1)^{2+1} M_{21} = (-1)^3 \begin{vmatrix} a_{12} & a_{13} \\ a_{32} & a_{33} \end{vmatrix} = -\begin{vmatrix} a_{12} & a_{13} \\ a_{32} & a_{33} \end{vmatrix},$$

$$A_{33} = (-1)^{3+3} M_{33} = (-1)^6 \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}.$$

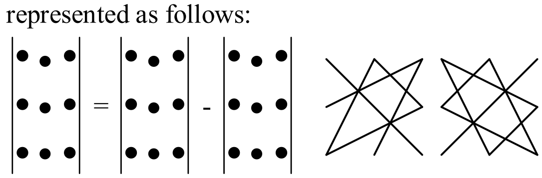
Methods for calculating the determinants of the third order.

The method of the triangle.

definition:

$$\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = a_{11}a_{22}a_{33} + a_{12}a_{23}a_{31} + a_{13}a_{21}a_{32} - a_{13}a_{22}a_{31} - a_{12}a_{21}a_{33} - a_{11}a_{23}a_{32}$$

To calculate the determinant of order 3 rule exists triangles, which can be schematically represented as follows:



Sarryusa method.

definition:

$$\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} \begin{matrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{matrix} = a_{11}a_{22}a_{33} + a_{12}a_{23}a_{31} + a_{13}a_{21}a_{32} - a_{13}a_{22}a_{31} - a_{11}a_{23}a_{32} - a_{12}a_{21}a_{33}$$

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Method of expanding on the elements of a row (column):

definition:
By the first line:

$$\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = (-1)^{1+1} \cdot a_{11} \cdot \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} + (-1)^{1+2} \cdot a_{12} \cdot \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + (-1)^{1+3} \cdot a_{13} \cdot \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix} =$$

$$a_{11} \cdot (a_{22}a_{33} - a_{23}a_{31}) - a_{12}(a_{21}a_{33} - a_{23}a_{31}) + a_{13}(a_{21}a_{32} - a_{22}a_{31});$$

(on the first row).

$$\Delta = a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$$

Basic properties of determinants:

1. Value of the determinant does not change if the string to replace the corresponding columns.
2. The determinant changes sign on the opposite, if we interchange two rows of the determinant.
3. Determinant of having two of the same row (column) is zero.

Proof. Let A - square matrix with two identical rows (column). B - matrix of the resulting permutation of identical rows (or columns) of the matrix A. Then, on the one hand, $\det B = -\det A$ $\det A = \det B$, on the other hand, by property 3. $\det B = -\det A$ Hence, from the last equality that. $\det A = 0$

4.Determinant is zero if all the elements of a series are zero.
5.The common factor of a series can be taken outside the determinant.
6. Determinant is equal to zero if the elements of two parallel rows are proportional.
7. Sum of the products of a number of elements of the cofactors corresponding elements of another parallel series is zero.
8. If each element of a number of the determinant is the sum of two terms, then this determinant is the sum of two determinants, the first of which consists of a number corresponding to the first term, and the second - in the second term.
9. Value of the determinant does not change if all elements of a number of relevant elements to add another parallel series, multiplied by the same number.
10. Determinant of a square matrix does not change as transposition:

$$\det A = \det A^T$$

Proof of property 1 for square matrices of order 2 and 3 carried out by a single scheme. We present evidence for a square matrix of order 2. Direct verification shows that property.

Determinants of n-th order.

Definition: The determinant of n-th order is a number written as a table:

$$\Delta_n = \begin{vmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{vmatrix}$$

Determinant of n-th order is calculated by reducing the order of: using the basic properties of determinants, the calculation of the determinant of order n can always be reduced to the computation of the determinant of the (n-1) th order, making in a number of elements of the determinant of all but one of equal zero [13].

Definition. Matrix of size m × n, where m-number of rows, n-number of columns is called a table of numbers arranged in a certain order. These numbers are called the elements of the matrix. Place each element is uniquely defined by row and column number, at the intersection where it is located [14]. Elements of the matrix are denoted aij, where i-line number, and j-column.

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{m1} & a_{m3} & \dots & a_{mn} \end{pmatrix}$$

Basic operations on matrices.

The matrix may consist of one line and one column. In general, the matrix may even consist of a single element.

Definition. If number of columns equal to the number of rows (m = n), then the matrix is called a square.

Definition. Matrix of the form:

$$\begin{pmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & 1 \end{pmatrix} = E,$$

called the identity matrix.

Definition. If amn = anm, then the matrix is called symmetric.

Example. symmetric matrix

$$\begin{pmatrix} 2 & 1 & 5 \\ 1 & 3 & 6 \\ 5 & 6 & 4 \end{pmatrix}$$

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