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«*Mathematics and Informatics in Science and*
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The book contains abstracts of V International Scientific and Practical Internet Conference "Mathematics and Informatics in Science and Education: Challenges of Modernity", which took place on May 1-2, 2025 on the basis of the Faculty of Mathematics, Physics and Computer Science of Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University.

The abstracts in the book are grouped by sections, in accordance with the main directions of the conference: Section A. Modern problems of mathematics. Modern problems of computer science. Mathematical and computer modeling; Section B. Creation of educational environment in mathematics and computer science in higher education. Monitoring of the quality of education: tools and technologies. Modern computer technologies in teaching mathematics and computer science; Section C. Methods of teaching mathematics and computer science in secondary education.

The publication is addressed to researchers, lecturers, teachers, graduate students, undergraduates, as well as everyone who is interested in modern problems of science and education.

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Збірник містить тези V Міжнародної науково-практичної Інтернет-конференції "Математика та інформатика в науці й освіті: виклики сучасності", яка відбулася 1-2 травня 2025 року на базі факультету математики, фізики і комп'ютерних наук Вінницького державного педагогічного університету імені Михайла Коцюбинського.

Тези у збірнику згруповано за секціями, відповідно до тематичних напрямів конференції: Секція А. Сучасні проблеми математики. Сучасні проблеми інформатики. Математичне та комп'ютерне моделювання; Секція Б. Формування освітнього середовища з математики та інформатики у закладах вищої освіти. Моніторинг якості освіти: засоби та технології. Сучасні комп'ютерні технології у викладанні математики та інформатики; Секція В. Методика навчання математики та інформатики в закладах середньої освіти.

Видання адресоване науковцям, викладачам, учителям, аспірантам, магістрантам, а також усім, хто цікавиться сучасними проблемами науки та освіти.

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APPLICATION SKM MAPLE TO REDUCE THE QUADRATIC FORM OF EXPRESSION TO THE CANONICAL FORM

Abstract. The problems of introduction and adaptation of the Maple computer mathematics system in the educational process in teaching the course of higher mathematics are considered. In the paper presents an adaptation the use of the SCM Maple student's package to reduce the quadratic form to the canonical form by the Lagrange.

Key words and phrases: computer mathematics system, Maple, information and educational environment, quadratic form, Lagrange method.

One of the main places among a significant number of systems of computer mathematics is occupied by SCM Maple, which allows the user to use an intelligent environment for mathematical research [1–8]. A significant share of SCM Maple also occupies in various scientific studies.

To perform inversions of expressions in SCM Maple, the specialized packages "linalg", "LinearAlgebra", and "student" are used.

```
restart;  
with(linalg) :  
with(LinearAlgebra) :  
with(student) :
```

The specialised «student» package is used to perform mathematical calculations, including simplifying algebraic expressions, and provides functions for working with algebraic expressions, such as square expansion.

The solution to the problem of reducing the quadratic form of an expression to the canonical form involves declaring the quadratic form, where the original quadratic

form includes the squares of the variables and mixed terms. After that, we proceed to check the coefficients and the initial substitution (Fig. 1).

The figure consists of two screenshots of the Maple 17 software interface, showing the execution of a script to reduce a quadratic form to its canonical form using the Lagrange method.

Top Screenshot: The script starts with the task description: "Задача. Привести квадратичну форму до канонічного виду методом Лагранжа:" (Task. Reduce the quadratic form to the canonical form by the method of Lagrange:). The initial quadratic form is defined as $A := x_1^2 - 6x_1x_2 + 2x_1x_3 + x_2^2 - 2x_2x_3 + 5x_3^2$. The script then performs a series of operations to complete the square for x_1 , resulting in $A := (x_1 - 3x_2 + x_3)^2 - 8x_2^2 + 4x_2x_3 + 4x_3^2$. It then completes the square for x_2 , resulting in $A := (x_1 - 3x_2 + x_3)^2 - 8\left(x_2 - \frac{1}{4}x_3\right)^2 + \frac{9}{2}x_3^2$. The script then performs a linear transformation to new variables y_1, y_2, y_3 and prints the canonical form: $y_1^2 - 8y_2^2 + \frac{9}{2}y_3^2$.

Bottom Screenshot: The script continues by printing the linear transformation used: $x_1 = y_1^2 + 3y_2^2 - \frac{1}{4}y_3^2$, $x_2 = y_2^2 + \frac{1}{4}y_3^2$, and $x_3 = y_3^2$. It then prints the final canonical form: $y_1^2 - 8y_2^2 + \frac{9}{2}y_3^2$.

Fig. 1 – Reduction of the quadratic form of an expression to the canonical form by the Lagrange method in SCM Maple

Part of the mathematical apparatus and developed code fragments in SCM Maple allow students to automatically perform the reduction of the quadratic form of an expression to the canonical form using Lagrange methods, which improves the quality of knowledge obtained while solving typical problems in higher mathematics.

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Contents

PLENARY SESSION

Bobyliiev D. LEAN AS A TOOL FOR INTERACTIVE THEOREM PROVING IN THE PROFESSIONAL TRAINING OF MATHEMATICS TEACHERS	5
Kikas E. SELF-REGULATED LEARNING AND MATH SKILLS. ESTONIAN EXPERIENCE IN ASSESSING SELF-REGULATED COMPETENCE	9
Tiutium L., Kosovets O., Soia O., Kovtoniuk M. MATHEMATICAL LANDSCAPE PARKS AS AN ENVIRONMENT FOR MODELING RESEARCH PROJECTS, SCIENTIFIC RESEARCH AND POPULARIZATION OF MATHEMATICS.....	12
Mädamürk K. ASSESSMENT OF MATH COMPETENCE IN ESTONIA	17
Mykhalevych V., Tiutiunnyk O., Dobraniuk Yu. SPECIFIC FEATURES OF REDUCING A VARIATIONAL PROBLEM OF HEREDITARY DAMAGE THEORY TO A NONLINEAR PROGRAMMING TASK.....	19
Kilp-Kabel T. ESTONIAN GRADE NINE NATIONAL MATH EXAM RESULTS: ITS RELATIONSHIP WITH INTEREST AND NOVEL MATH SKILLS.....	22
Bak S., Kovtoniuk H. ON TRAVELING WAVES IN FERMI–PASTA–ULAM-TYPE SYSTEMS WITH NONLOCAL INTERACTION ON A 2D-LATTICE.....	26
Sigus H. BASIC PSYCHOLOGICAL NEEDS AND CURIOSITY RELATED TO SCIENCE SUBJECTS IN ONE SCHOOL SETTING IN ESTONIA.....	31
Abramchuk V., Abramchuk I. MATHEMATICAL MODELS IN DIGITAL INFORMATION CODING TASKS.....	33
Nurmoja K. BASIC PSYCHOLOGICAL NEEDS AND CURIOSITY RELATED TO SCIENCE SUBJECTS IN ONE SCHOOL SETTING IN ESTONIA.....	36

SECTION A

MODERN PROBLEMS OF MATHEMATICS.

MODERN PROBLEMS OF COMPUTER SCIENCE.

MATHEMATICAL AND COMPUTER MODELING

Bondarenko Z., Kyrylashchuk S., Klochko V. OPTIMIZATION OF HEATING SYSTEMS BASED ON IOT DATA ANALYSIS AND FOURIER TRANSFORM.....	38
Boyko P., Lopushanska H. SOURCE INVERSE PROBLEM IN SPACES OF BESSEL POTENTIALS.....	43
Buhrii O., Holovenko A. NUMERICAL APPROXIMATION OF SOLUTIONS OF STOCHASTIC DIFFERENTIAL EQUATIONS.....	45
Dobraniuk Yu., Blashchuk N., Barbaliuk M. APPLICATION SKM MAPLE TO REDUCE THE QUADRATIC FORM OF EXPRESSION TO THE CANONICAL FORM.....	46
Goy T. SOME PROPERTIES OF HIGHER-ORDER PELL NUMBERS VIA TOEPLITZ – HESSENBERG DETERMINANTS.....	49
Heseleva K. APPLICATION OF A SINGLE VARIANT OF THE COLLOCATIONAL-ITERATIVE METHOD FOR INTEGRO-FUNCTIONAL EQUATIONS WITH SMALL NONLINEARITY.....	52
Hudyma U., Gnatyuk V. THE CRITERION OF EXTREMALITY OF AN ELEMENT FOR THE PROBLEM OF FINDING A GENERALIZED STEINER’S POINT OF SEVERAL CLOSED BALLS IN A LINEAR NORMED SPACE WITH RESPECT TO A CONVEX SET OF CLOSED BALLS IN THIS SPACE.....	56
Lukin M., Yakunin A. GIELIS SUPERCURVES – A TECHNOLOGICAL TOOL FOR MODELING COMPLEX SHAPES.....	59
Pylypiuk T. DATA ANALYTICS AND VISUALIZATION IN POWER BI.....	62

Mykhalevych V., Kolisnyk M., Shtuts A. MATHEMATICAL MODELING OF DEFORMATION TRAJECTORIES OF MACROPARTICLES IN HAZARDOUS ZONES OF WORKPIECES DURING FLOW FORMING.....	65
Shchyrb V., Miastkovska M. MULTIPROCESSING METHODS FOR FORMING OPTIMIZATION ROUTES USING THE ANT COLONY ALGORITHM.....	68

SECTION B

CREATION OF EDUCATIONAL ENVIRONMENT IN MATHEMATICS AND COMPUTER SCIENCE IN HIGHER EDUCATION. MONITORING OF THE QUALITY OF EDUCATION: TOOLS AND TECHNOLOGIES. MODERN COMPUTER TECHNOLOGIES IN TEACHING MATHEMATICS AND COMPUTER SCIENCE

Abramchuk V., Babiuk D., Tiutiun L. USING ARTIFICIAL INTELLIGENCE CAPABILITIES IN TEACHING AND ASSESSING THE QUALITY OF KNOWLEDGE IN MATHEMATICS	72
Barbolina T. IMPLEMENTING STUDENT-CENTERED AND DIGITAL LEARNING METHODS AT POLTAVA NATIONAL PEDAGOGICAL UNIVERSITY WITHIN THE ERASMUS+ BOOST PROJECT.....	77
Dovbnia O. VIDEO AS A MEANS OF FUNDAMENTALIZING THE TEACHING OF COMPUTER SCIENCE DISCIPLINES.....	79
Haybun L., Kravchuk O. LIVEWORKSHEETS – NEW OPPORTUNITIES FOR TEACHERS AND STUDENTS.....	82
Ilnitska Yu., Medvedska V. INNOVATIONS IN COMPUTER SCIENCE EDUCATION THROUGH BLOCKCHAIN TECHNOLOGY.....	85
Kashkanova H. DIDACTIC BASIS OF THE COMPETENCY-BASED APPROACH TO THE FORMATION OF PROFESSIONAL ORIENTATION WHEN STUDYING THE COURSE OF FUNDAMENTAL DISCIPLINES IN A TECHNICAL INSTITUTION OF HIGHER EDUCATION.....	89

Khomyuk I., Khomyuk V. MULTIMEDIA TECHNOLOGIES IN THE PROCESS OF TEACHING HIGHER MATHEMATICS.....	92
Kovtoniuk M., Soia O. MODERN ASPECTS OF MATHEMATICS TEACHING METHODS IN THE PROFESSIONAL TRAINING OF FUTURE MATHEMATICS TEACHERS.....	94
Medvedska V., Maranchak V. VIRTUAL AND AUGMENTED REALITY IN EDUCATION: INNOVATIVE APPROACHES TO TEACHING EXACT SCIENCES.....	98
Panasenko O. DIGITAL ADMINISTRATION AND MONITORING OF FACULTY ACTIVITIES USING GOOGLE SHEETS AND PYTHON.....	102
Rumyantseva K. THE EFFECTIVENESS OF THE USE OF MODERN SOFTWARE IN THE MATHEMATICAL TRAINING OF FUTURE ECONOMISTS.....	106
Klochko V., Klochko O. FUNCTIONS OF CONSTRUCTIVE MATHEMATICS TEACHING USING DIGITAL TECHNOLOGIES.....	109
Kolomiiets A., Klochko V., Kyrylashchuk S. FUNCTIONAL APPROACH TO THE FUNDAMENTALIZATION OF MATHEMATICAL TRAINING OF STUDENTS OF TECHNICAL SPECIALTIES.....	113
Kolomiiets A., Lysi M., Kovalchuk M. THE TASK APPROACH IS ONE OF THE CONCEPTUAL APPROACHES TO FUNDAMENTALIZING THE MATHEMATICAL TRAINING OF STUDENTS OF TECHNICAL SPECIALTIES.....	117
Kravchuk O. ANALYTICAL GEOMETRY AS A MEANS OF FORMING PROFESSIONAL-PEDAGOGICAL COMPETENCES OF FUTURE MATHEMATICS TEACHERS.....	121
Shvai O. CREATING TASKS OF PATRIOTIC CONTENT AS AN ELEMENT OF FUTURE TEACHERS PROFESSIONAL TRAINING.....	124

SECTION C

CREATION OF EDUCATIONAL ENVIRONMENT IN MATHEMATICS AND COMPUTER SCIENCE IN HIGHER EDUCATION

Hrytsaiuk D., Soia O. THE ROLE OF THREE-DIMENSIONAL MODELING IN THE DEVELOPMENT OF CRITICAL AND SPATIAL THINKING OF STUDENTS.....	126
Ivatsko T., Krupskyi Y. APPLICATION OF FORMATIVE ASSESSMENT METHODOLOGY IN COMPUTER SCIENCE LESSONS DURING THE FORMATION OF PROFESSIONAL COMPETENCES OF STUDENTS.....	130
Klimishyna A. DEVELOPING PROBABILISTIC THINKING IN STUDENTS DURING THE STUDY OF MATHEMATICS IN GENERAL SECONDARY EDUCATION INSTITUTIONS.....	134
Kolomiets O. DEVELOPMENT OF SCIENTIFIC AND TECHNICAL DIRECTION IN THE EDUCATIONAL AND METHODOLOGICAL ACTIVITIES OF LYCEUMS THROUGH STEM EDUCATION.....	137
Kosovets O. SPECIFICS OF TEACHING BLIND STUDENTS TO PROCESS TABLE DATA.....	141
Kosovets O., Krupka V. GAME-BASED LEARNING METHODS IN COMPUTER SCIENCE LESSONS AT A VOCATIONAL SCHOOL.....	144
Kravchuk O., Nykytiuk A. DIFFERENTIATED APPROACH TO TEACHING DIFFERENTIAL EQUATIONS IN SPECIALIZED CLASSES.....	147
Kravchuk O., Moroz S. USE OF INNOVATIVE TECHNOLOGIES WHEN STUDYING TOPIC «EQUATION OF A CIRCLE» AT SCHOOL.....	150
Kravchuk O., Panasiuk A. COMPARATIVE ANALYSIS OF METHODOLOGICAL APPROACHES TO THE STUDY OF ELEMENTS OF ANALYTICAL GEOMETRY IN ZZSO AND HIGHER SCHOOL USING ICT: THE TOPIC «PLANE EQUATIONS».....	154

Shevchuk P., Soia O. SYSTEM APPROACH TO MODELING INDIVIDUAL TRAJECTORY OF INFORMATICS TEACHER'S PROFESSIONAL DEVELOPMENT.....	158
Dumanska T. THE PLACE OF INTERACTIVE WORDWALL ACTIVITIES IN A MATHEMATICS LESSON.....	161
Hera Yu. FOSTERING CREATIVITY IN SPECIALIZED SECONDARY SCHOOL STUDENTS THROUGH ACTIVE LEARNING IN COMPUTER SCIENCE CLASSES.....	164
Korolskyi V. ON THE METHODS OF CALCULATING THE NUMBER π	167
Kravchuk O., Nykytiuk A. DIFFERENTIATED APPROACH TO TEACHING DIFFERENTIAL EQUATIONS IN SPECIALIZED CLASSES.....	170
Voievoda A., Prytuliak M. PSYCHOLOGICAL AND PEDAGOGICAL PREREQUISITES FOR THE USE OF COMPUTER DIDACTIC GAMES IN THE PROCESS OF TEACHING MATHEMATICS.....	173
Kravchuk O., Aleksandruk A. INFORMATION AND COMMUNICATION TECHNOLOGIES AS A MEANS OF INCREASING MOTIVATION IN MATHEMATICS LESSONS IN 5TH GRADE.....	177