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Jan Długosz University of Częstochowa
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NOTION OF DISTANCE FOR EUCLIDEAN PLANE

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Abstract. One motivation for developing axiomatic systems is to determine precisely which properties of certain objects can be deduced from which other properties. The purpose is to choose a certain fundamental set of properties from which the other properties of the object can be deduced. Some of axioms of Euclidean plane based on the notion of distance are considered. The notions of linear and planar sets are introduced in terms of distance. Thus Euclidean plane is regarded as a distance space with a metric satisfying the corresponding properties.

Jan Długosz University of Częstochowa
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THE COROLLARY OF GREEN'S THEOREM FOR CURVILINEAR INTEGRALS

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Abstract. One of the very important applications of the multidimensional real integrals in the technical practice is a calculation of areas and volumes of solids in generally n-dimensional space $\mathbf{R}_n$. In the paper [1], that problem is investigated as a topological problem and the formula for the calculation of the volume of the n-dimensional solid in the space $\mathbf{E}_n$ is proved there. For the calculation of these volumes, parametric descriptions of the surface areas of solids are necessary. Then the surface areas are smooth (respective by parts smooth) areas in Euclidean space of the corresponding dimension. Using that theory we need multidimensional real integrals of the dimension $n-1$ for calculation of volumes of solids in $\mathbf{E}_n$. The calculations of these integrals are easier. That method shows a new theoretical and practical approach to the solving of the known problems. In this paper, the correspondence between that new theory in $\mathbf{E}_2$ and the known result of the curvilinear integral theory (i.e. a calculation of an area of a closed bounded figure by a curvilinear integral) is presented.

Jan Długosz University of Częstochowa
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TRIANGULAR STRUCTURES AND DUALITY[1]

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Abstract. We introduce and study the category AFD the objects of which are generalized convergence D-posets (with more than just one greatest element) of maps into a triangle object T and the morphisms of which are sequentially continuous D-homomorphisms. The category AFD can serve as a base category for antagonistic fuzzy probability theory. AFD-measurable maps can be considered as generalized random variables and ADF-morphisms, as their dual maps, can be considered as generalized observables.

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Stability of the equation of ring homomorphisms

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Abstract

Let $\mathcal{R}$ be a unitary ring and $(\mathcal{A}, \|\cdot\|)$ stand for a Banach algebra with a unit. In connection with some stability results of R. Badora [1] and D.G. Bourgin [2] concerning the system of two Cauchy functional equations

$$\begin{cases} f(x+y) = f(x) + f(y) \\ f(xy) = f(x)f(y) \end{cases} \tag{$*$}$$

for mappings $f : \mathcal{R} \longrightarrow \mathcal{A}$, we deal with Hyers-Ulam stability problem for a *single* equation

$$f(x+y) + f(xy) = f(x) + f(y) + f(x)f(y)\,. \tag{$**$}$$

The basic question whether or not equation $(**)$ is equivalent to the system $(*)$ has widely been examined by J. Dhombres [3] and the present author in [4] and [5].

Jan Długosz University of Częstochowa
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SPECIAL PARTIAL ORDERINGS IN SIMPLE GRAPHS

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Abstract. We show an algorithm checking whether in a given simple graph G it is possible to introduce a partial ordering whose covering relation agrees with the adjacency relation in G.

Jan Długosz University of Częstochowa
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RANDOMLY kC_n GRAPHS

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Abstract. A graph G is said to be a randomly H graph if and only if any subgraph of G without isolated vertices, which is isomorphic to a subgraph of H, can be extended to a subgraph H_1 of G such that H_1 is isomorphic to H. The problem of characterization of randomly H graphs, where H is $r-$regular graph on p vertices, was given by Tomasta and Tomová. In general, the characterization of such graphs seems to be difficult. However, there exist several results for the case $r = 2$. Chartrand, Oellermann, and Ruiz characterized randomly C_n graphs. Híc and Pokorný characterized randomly $2C_n$ graphs, as well as randomly $C_n \cup C_m$ graphs, where $n \neq m$. In this paper, the problem of randomly H graphs, where $H = kC_n, k > 2$ is discussed.

Jan Długosz University of Częstochowa
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REMARKS ON CONNECTIVITY AND I-CONNECTIVITY

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The following definition has been introduced by Jadwiga Knop and Małgorzata Wróbel in 2006 (see [3]).

(J. Knop & M. Wróbel – 2006) A subset A of a topological space X is called to be i-connected if it is connected and $\mathrm{Int}(A)$ is nonempty and connected.

Of course this definition requires much more from a set as for usual connectedness. However, in the space of real numbers endowed by natural topology each connected set fulfils the condition from definition [3]. Some of properties of i-connected sets were described in that article. We want to discuss the problem, in what kinds of spaces each connected set is also i-connected.

Jan Długosz University of Częstochowa
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SOME PROPERTIES OF i–CONNECTED SETS (part II)

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Abstract. A generalization theorem for i–connected sets in the Hashimoto topology is given. Moreover, i–connectivity in the topology of at most countable complements and in the order topology is presented.

Jan Długosz University of Częstochowa
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PROBLEM OF THE EXISTENCE OF $\omega^\star$-PRIMITIVES

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Abstract. If (X,ρ) is a dense in itself metric space and $f\colon X\to R$, then we define $\omega^*(f,x)=\inf_{r>0}\sup_{y,z\in\mathbf{B}(x,r)\setminus\{x\}}|f(y)-f(z)|$. We say that a function $F\colon X\to R$ is an $\omega^\star$- primitive for $f\colon X\to R$ if $\omega^\star(F,\cdot)=f$. We discuss problem of the existence of $\omega^\star$-primitives for an arbitrary upper semicontinuous function $f\colon X\to[0,\infty)$ defined on a dense in itself metric space. At the end we show that if an upper semicontinuous function $f\colon X\to[0,\infty)$ is defined on a nonmetrizable topological space, then $\omega^\star$-primitive may not exists.

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APPLYING THE IDEA OF FUSIONISM IN THE PROBABILITY THEORY

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Abstract. The solutions presented in this paper may serve as an illustration of „the principle of internal integration", know as the idea of fusionism. In the paper we consider some problem. From an urn containing b white balls and c black ones are selected simultaneously some balls. If the balls are of the same colours one of the players wins, otherwise the other player is the winner. For which values of b and c is the game fair?

Jan Długosz University of Częstochowa
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EXPONENT IN ONE OF THE VARIABLES

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Abstract. A periodicity functional equation of one complex variable which characterizes the exponential function is discussed. This functional equation can be generalized to equation for functions depending on two complex variables. It is conjectured that the second functional equation also characterizes the exponent. Applications to representations of complex continuous elementary functions are discussed.

Jan Długosz University of Częstochowa
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PRESENTATION OF A NEW BILINGUAL MATHEMATICAL DICTIONARY

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Abstract. In the contribution I am presenting a new English–Czech–English mathematical dictionary, which was prepared for university students in the Czech Republic, in the form of an on-line application with unrestricted access.

Jan Długosz University of Częstochowa
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UNDER AND EXACT ESTIMATES OF COMPLEXITY OF ALGORITHMS FOR MULTI-PEG TOWER OF HANOI PROBLEM

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Abstract. It is proved under and exact estimates of complexity of algorithms for the multi-peg Tower of Hanoi problem with the limited number of discs.

Jan Długosz University of Częstochowa
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ANOMALOUS DIFFUSION EQUATION

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Abstract. Essentials of the Riemann-Liouville fractional calculus are recalled. Nonlocal generalizations of the Fourier law of the classical theory of heat conduction relating the heat flux vector to the temperature gradient and of the Fick law of the classical theory of diffusion relating the matter flux vector to the concentration gradient lead to nonclassical theories. The time-nonlocal dependence between the flux vectors and corresponding gradients with "long-tale" power kernel can be interpreted in terms of fractional integrals and derivatives and yields the time-fractional diffusion equation.

Jan Długosz University of Częstochowa
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PROPERTIES OF FOURIER COEFFICIENTS OF SPLINE WAVELETS

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Abstract. Periodic B-spline functions have got many useful properties. Especially it is the property of its Fourier coefficients. In this article it is introduced and proved a similar property of Fourier coefficients of spline wavelets.

Jan Długosz University of Częstochowa
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GENERAL APPROACH TO DETERMINING THE BASIC CHARACTERISTICS OF QUEUEING SYSTEMS WITH FINITE TOTAL CAPACITY

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Abstract. We discuss a general view of solutions for characteristics of non-classical queueing systems with random capacity customers (demands), i.e. we suppose that each customer is characterized by some random capacity (volume) and the whole capacity (total volume) of customers present in the queueing system is bounded by a constant walue $V > 0$. We determine the general view of the stationary number distribution and loss probability in the systems under consideration as compared with corresponding classical queueing systems. It's turned that in some cases we can write expressions for non-classical characteristics of finite total capacity queues if corresponding classical characteristics are known.

Jan Długosz University of Częstochowa
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A NEW ITERATIVE METHOD FOR SOLUTION OF THE DUAL PROBLEM OF GEOMETRIC PROGRAMMING

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Abstract. In this article a new method of optimal solution of the dual problem is proposed. This method is based on Newton's attraction theorem. An estimate of iteration convergence is given. The method uses some new procedure of correction of the current iteration. It is shown that the method uses matrix operations at each step of calculations and has a quadric speed of the convergence.

Part II. Theory of training teachers of mathematics

Jan Długosz University of Częstochowa
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COMMUNICATION IN MATHEMATICS SUPPORTED BY INFORMATION TECHNOLOGIES

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Abstract. I deal with possibilities how to apply Information Technologies in teaching of mathematics. I depict a contemporary state of IT use in teaching in European countries. I report the results of an experiment, which goal was to use the Equation Grapher program in teaching of linear and quadratic functions. I state the subsequent hypothesis: Information technologies, or more precisely Equation Grapher, can be effectively used in the phase of exercise and revision of the topic.

Jan Długosz University of Częstochowa
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THE INNOVATION ACCESS TO MATHEMATIC EDUCATION AT AN ELEMENTARY SCHOOL

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Abstract. The article is about one of the possible forms of mathematics education at elementary schools. We are getting closer to possible shifts from the traditional education process (desk, crayon, notebook, pen and drawing material) to an innovated one, using a computer and software equipment. This change requires a new approach from teacher as well as realising, what materials are to be prepared for students, or how to manage the lesson etc. The article deals with the term "work sheet for student", "work sheet for teacher", its creation and its exact implementation in educational process. The article is trying to solve the problem of what software can be used in math's education, esp. for its better presentation /imagination/ and explanation to students. Students get familiar with new terms and discover new information by solving a problem-like exercise. They do not consider the information to be a theorem or a sentence, told by the teacher. They get confident about their own truth, because they solve the problem alone, in line with a "work sheet" and in inspiring environment.

Facts presented in this article are based on teaching experience in various areas of mathematics. The article is focused on geometry education at elementary schools.

Jan Długosz University of Częstochowa
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WORD PROBLEMS DESCRIBING MOVEMENT

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Abstract. Since several years we have already been oriented to creation of multimedia teaching aids for teaching mathematics in the elementary school. We have successfully solve out variety of grants in this topic. We are developing international relations and cooperation. The results of our work is a program, in which we have tried to create alternative point of view of motivation and work of pupils, who are solving out word problems describing movement. While fore thinking the didactic questions related with creation of software Word problems describing movements we have focused on the matter of motivation and creation of sufficient amount of separated models of visualization and feedback.

Jan Długosz University of Częstochowa
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THE USE OF FINITE EXPANSION OF FUNCTIONS FOR EVALUATION OF LIMITS

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Abstract. The theory of finite expansions of functions is very helpful in evaluation of complicated limits. One-variable functions are replaced by appropriate polynomials. Extensive chapters in French textbook are devoted to the theory of finite expansions and its applications. In Polish mathematical literature the problem of finite expansions is omitted. More complicated limits are evaluated using l'Hôpital's rule or Taylor and Maclaurin series. However, there exists close connection between those series and finite expansions. The goal of this paper is popularization of the theory of finite expansions on the Polish ground.

Jan Długosz University of Częstochowa
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RECURRENT EQUATIONS FOR THE ARITHMETICAL AND GEOMETRICAL SEQUENCES OF HIGHER DEGREE

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Abstract. Recurrent equations concern relationships between some (in general in a neighbourhood) elements of sequences. By these equations one can evaluate an arbitrary element of such sequences. In this paper we consider recurrent equations for the arithmetical and geometrical sequences of higher degree. We also give some properties of these sequences.

Jan Długosz University of Częstochowa
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SOME ASPECTS OF TEACHING THE CONCEPTS: ARITHMETIC AND WEIGHTED MEANS AT VARIOUS LEVELS OF MATHEMATICAL EDUCATION

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Abstract. We refer to selected problems of formulating the definitions of arithmetic and weighted means in secondary school and at a higher level. The first problem discussed here are the results of theoretical research. We compare the manner of formulating the definitions, in particular, the level of formalization of mathematical language. We present the differences between various definitions, found in the analyzed textbooks, in such aspects as: generality, degree and kind of complication of logical structure, and intuitions provoked by them. We underline qualitatively different objects defined by them - arithmetic mean of numbers and arithmetic mean of scalable feature, emphasizing the consequences.

Jan Długosz University of Częstochowa
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ANALOGICAL PROBLEMS IN THE PLANE AND SPACE

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Abstract. It is possible to form analogical problems concerning 2D objects in the space for 3D objects. As for students profitable is to learn how to formulate and solve this 3D problems, especially those ones whose solution requests non-trivial modification of the solution of the original problem.

Jan Długosz University of Częstochowa
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ABOUT A DISTRIBUTION OF POINTS ON A LINE SEGMENT[2]

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Abstract The concept of infinity is a key term in mathematics and its teaching. The development of knowledge about infinity makes an essential milestone important for its further development. If we accept the theory of so called genetic parallel that the ontogenetic development is not independent of the phylogenetic development, it is possible to assume that the obstacles we can identify in the phylogenetic development of infinity can be found also in ontogenesis and that overcoming the obstacles is a necessary component of the cognitive process of individuals.

The research activities conducted under the framework of the three year project GAČR *Obstacles in phylogenetic and ontogenetic development of the concept of infinity* are focused on the study of phylogeny development of infinity and also on the study of ontogenetic development of infinity among today's population. The research should be crowned by formulations of suggestions how to overcome the identified obstacles.

[2]The contribution was supported by the grant GAČR 406/07/1026.

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COMPENSATION OF STUDENTS' HANDICAP IN MATHEMATICAL DISCIPLINES

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Abstract. *Repetitorium of mathematics*, which has been suggested as a part of the *Teacher training for elementary schools* programme in all forms of study, is aimed at levelling basic mathematical knowledge and skills of students entering university from various types of secondary schools with various positions of mathematics in the curricula.

Jan Długosz University of Częstochowa
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GAINING MATHEMATICAL SKILLS BY USING 'CONCRETE' MANIPULATIVES

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Abstract. In this issue we propose the reasons why it is important to use a variety of 'concrete' manipulatives in the classroom starting from the earliest ages. And for the teachers who can see the importance of using manipulatives in their classroom, we offer some new innovative ideas.

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MATHEMATICAL STATISTICS AND MATHEMATICAL DIDACTICS

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Abstract. In standings related with didactical experiments we have often need to use statistical check of our hypothesis. Though we consider that our method is correct or that some other method is wrong, we cannot make any claim whiteout mathematical background. Statistical proving of didactical hypothesis enables as to put our standings on mathematical standings. A most of didactical theories in some of their part use statistical proving.

Mathematical statistics enable as this goal to fulfill. Problem on which we could come upon when we start to chose statistical method which is most adequate for our needs, or our experiment needs, is fulfilling conditions which must be satisfied before we use some method. One of the most often conditions is condition than our sample is from normal distribution. This problem can be solved with central limit theorem of mathematical statistics.

In this work I would like to make more observation about cases where is not proper to use central limits theorem. This could be happening from several reasons: maybe sample that we have in not enough big, maybe we have interest, or our didactical experiment demand, knowing preciously to which distribution function belong our sample.

Jan Długosz University of Częstochowa
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ATTENTION OF TEACHERS TO PUPILS INTERESTED IN MATHEMATICS IN THE 4TH CLASS AT ELEMENTARY SCHOOL

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Abstract. This paper presents some results achieved with carefulness for pupils with larger interest in mathematics in the 4^{th} class at elementary school. We gave attention to two subjects – teacher and his (her) pupils. We mention the first one in this paper. We have found out certain reserves at work with these pupils including gifted pupils, mainly at out of educational time. Research shows needs to improve the quality of preparation for pupils interested more in mathematics. It is also connected with preparation of next teachers at universities.

Jan Długosz University of Częstochowa
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EQUATIONS $f(x) = f^{-1}(x)$ AS A GENERATOR OF MATHEMATICS TEACHING PROBLEMS

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Abstract Within the secondary school mathematics, the notion of an inverse function and its relationships to the original function does not attract much attention. In this article we deal with equations of the type $f(x) = f^{-1}(x)$ as a source of problems the solution of which leads to a better understanding of the notion of an inverse function. We make use of the PC programs Derive and WinPlot.

Jan Długosz University of Częstochowa
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ABOUT SOME DIFFICULTIES IN DOING PROOFS ENCOUNTERED BY THE STUDENTS FROM THE FIRST YEAR OF MATHEMATICS

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Abstract. This paper contains some results of diagnostic research on the difficulties that students who begin studies at the tertiary level encounter when doing proofs from a section devoted to applying definitions in proofs. The considerations concern the issues connected with understanding of the role of definition and understanding of the texts of definitions by students. In these considerations the examples of solutions given by students to two diagnostic tasks applied in the research are used.

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MATHEMATICAL TASK STATEMENT

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Abstract. The text describes a task which must be solved on the analyze of propounded problem. Pupils and students solving these types of tasks are taught to think about the mathematical problem and to develop mathematical consideration. The following task also shows what way the mathematical problem statement can affect the difficulty of task solving.

Jan Długosz University of Częstochowa
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FROM MIRROR REFLECTION TO THE CONCEPT OF LINE SYMMETRY ON THE PLANE

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Abstract. In this paper I would like to discuss the growth of one of the geometrical concepts: mirror reflection and the way the child pass during the process of discovering certain properties leading to the concept of line symmetry.

I will analyse some specific characteristic situations observed in following stages of my scientific work, which are supposed to present the evolution of understanding the mirror reflection by children through acquiring experiences. I will also show how children discovered properties which preserve in mirror reflection (shape and size) and the ones which change themselves (orientation of the figure). Research lasted 4 years. Detailed description of whole research and research tools one can find in [1–3].

Jan Długosz University of Częstochowa
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ON OBJECTIVE AND SUBJECTIVE DIFFICULRTIES IN UNDERSTANDING THE NOTIONS OF THE LEAST UPPER BOUND AND THE GREATEST LOWER BOUND

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Abstract. The notion of the least upper bound (the greatest lower bound) of a subset of real numbers is discussed from different points of view and some difficulties of this notion are presented.

Jan Długosz University of Częstochowa
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DEVELOPMENT OF CHILD CONSTRUCTIONS – INTERCONNECTION OF RESEARCH AND STUDENTS' TRAINING AT SCHOOL

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Abstract. Course of pre-mathematics includes theory as well as practice. The development of different competences is uneven. Sometime students have difficulties to imagine how to take advantage of research results (part of research VZ MSM002160862). The goals of student practice training: to observe children and to enroll the development of special abilities, (pre)-concepts, to use in practice one of diagnostic activities with children. The development of construction with build-set is used as a one of the themes which can link all these goals.

Jan Długosz University of Częstochowa
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EXAMPLES OF INVESTIGATIONS FOR BEGINNERS

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Abstract. There are examples of several types of investigations available for beginners: 1. search for patterns, 2. iterating a certain procedure and analysing the results, 3. looking for exceptions, or special cases in a pattern, 4. generalizing given problem.

Jan Długosz University of Częstochowa
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COEFFICIENTS OF LEARNING IN MATHEMATICAL AND NONMATHEMATICAL SUBJECT MATTER

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Abstract. "Coefficient to remember something" was introduced in cybernetic pedagogy. This coefficient expresses what part of information (from group of letters arranged without meaning) a learner is able to remember after one repetition. He can remember about 1/23 (4,34%) received information. We have derived "coefficient of learning". Its values are greater, because understandable learning (we mean it) is more effectively than memory learning. We used this coefficient as expression of improvement of soft motive hand. Its value was about 6%. We found out it in ten pictures arranged chronologically during 4 months. We valued subject matter pretension by "coefficient of understanding". We found out what children could understand subject matter with one repetition. Similarly "coefficient of disclosing" was introduced for revealing of coherence reading of picture. It was 38% after the first experiment. It means that this number of children revealed coherence in the picture. It is possible to value subject matter pretension effectively and briefly according to introduced coefficients in standard class. On the other hand it is possible to value knowledge level of pupils by using standard subject matter.

Jan Długosz University of Częstochowa
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THE CONTEXT OF MEANING AND UNDERSTANDING OF MATHEMATICS WHICH HELPS STUDENTS TO UNDERSTAND ITS SENSE AND TO SEE THE AREA OF ITS APPLICATION

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Abstract. The purpose of the presentation is to show that the key to the process of the developing acquisition of mathematics is the emphasis that students should put on the right choice of the appropriate realistic contexts. There are many ways of considering this problem, for instance, the constructivist approach, the socio-cultural approach. Moreover, there is an idea of the epistemological triangle, which is considered a necessary tool for the analysis of the form and the degree of the development of mathematical meanings.

Jan Długosz University of Częstochowa
Scientific Issues, Mathematics XII, Częstochowa 2007

THE ROLE OF THE MILTISTAGE TASKS IN DEVELOPING THE CREATIVE ACTIVITY OF MATHEMATICS TEACHERS

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Abstract. This papier presents the results of the research carried among the mathematics teachers. These research deals with the skills of undertaking creative mathematical activity by the teachers. It also deals with the awareness of the need of developing different kinds of this activity among students. The main tool which is used and studied in the research is the multistage task.

Jan Długosz University of Częstochowa
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SOME REMARKS ON DEFINITION OF THE ABSOLUTE VALUE OF A REAL NUMBER

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Abstract. The article presents a didactic proposition of introducing the definition of the absolute value of a real number.

Jan Długosz University of Częstochowa
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ELECTRONIC TEXTBOOK IN LMS MOODLE

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Abstract. Moodle is the software used as a tool for on-line distance learning as well as a support for face-to-face teaching. The article outlines the structure of electronic textbook for LMS Moodle and the ways in which it can be utilised in training prospective elementary mathematics teachers under conditions of Prešov's Faculty of Education.

Jan Długosz University of Częstochowa
Scientific Issues, Mathematics XII, Częstochowa 2007

HOW MANY AND WHAT KIND OF STOOLS CAN BE BUILT BY A CARPENTER? – MEANING HOW PEDAGOGICS STUDENTS SOLVED CERTAIN PROBLEMS

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Abstract. Uncommon mathematical problems play an important role in childrens' education in mathematics. These exercises inspire creativity in children and help them develop a sense of divergent thinking. Pedagogics students, as future teachers, must not only recognize the value of such mathematical problems, but must also be able to solve them. This article is a presentation of the skills of the students in this regard.

Jan Długosz University of Częstochowa
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MATHEMATICS MADE POPULAR: A CHANCE FOR BOTH PUPILS AND TEACHERS

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Abstract. The contribution reports on an untraditional presentation of mathematical activities for elementary school pupils, which are being prepared as a part of grant focused on developing pupils' interest in mathematics and change of their attitude to mathematics as a school subject. Solving non-standard tasks, competitions, games and manipulative activities provide pupils, teachers and parents with a chance to change their perception of school mathematics.

Jan Długosz University of Częstochowa
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THE REALISATION OF SELECTED ATTRIBUTES OF 'FUNCTION' USING THE PROJECT METHOD

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Abstract. The notion of function plays a crucial role in teaching mathematics. Why is this important issue so problematic for students? It is worth noticing that precise specification of this notion took place relatively late, in 19th century. This is why it is so important to attempt students' active participation in defining and understanding the notion of 'function'.

Jan Długosz University of Częstochowa
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PROBLEMS TEACHER'S PRACTICE FORMING MATHEMATICAL ACTIVITY AND CREATIVITY OF THE GIFTED PUPILS

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Abstract. The subject of the work, Problems teacher's practice forming mathematical activity and creativity of the gifted pupils, is submerged in the issue of one of the contemporary trends in researching the methodology of teaching maths, which is called: **activity and creativity in teaching mathematics - theory, diagnosis and methodology, prospects.** In this work I refer to certain synthesis of the knowledge to that point, see A. Pardała (2003, 2004, 2006). I also articulate one of its' aspects - the crucial importance of teacher's intervention on activity and creativity of a student, who is solving a mathematical problem. And then I synthetically present findings of research, assessing teacher's impact on stimulating a gifted student, in particularly which was done for doctoral thesis by E. Śmietana (2005). Those examples are some kind of proofs, which enrich the practice of stimulating mathematical activity and creativity of students. Moreover, they confirm that it is not just about looking for only one optimal and effective way of their creation. It is rather about healthy competition that gives school, as well as students wider vision for the reached level of mathematical activity and creativity. In summery of my work, I put forward some remarks and final reflections related to mathematical activity and creativity in gifted students' education.

Jan Długosz University of Częstochowa
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MENTAL MANIPULATION WITH A NET OF A SOLID

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Abstract. The contribution deals with selected options for development of space imagination of pupils as an important competence, which can support role of mathematics in development pupil's personality. We talk about tasks, in which space imagination is implemented during mental manipulation, when pupil creates a solid from a net of solid in a playful manner.

Jan Długosz University of Częstochowa
Scientific Issues, Mathematics XII, Częstochowa 2007

GEOMETRIC CONSTRUCTIONS AS PROBABILISTIC SPACES CONSTRUCTIONS

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Abstract. The study proposes a visualization of the discrete probabilistic space idea as well as its construction.

Jan Długosz University of Częstochowa
Scientific Issues, Mathematics XII, Częstochowa 2007

TEACHER'S STUDIES STUDENTS DIFFICULTIES CONCERNING THE GENERALIZATION OF THE CONCEPT OF THE RIEMANN INTEGRAL

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Abstract. One of the most fundamental concepts of the mathematical analysis is the Riemann integral. For a teacher of mathematics the concept of the integral is important because of the connections with the Jordan measure which is considered in the elementary geometry. Besides the Riemann integral the course of mathematical analysis includes multiple integrals, line integrals and surface integrals. In this paper we present the results of our research concerning the difficulties of students in noticing mutual connections between different kinds of integrals.

Jan Długosz University of Częstochowa
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EXPERIENCE WITH TEACHING COURSE OF "FUN MATHEMATICS"

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Abstract. The programs of study offered by the Faculty of Education of the University of Prešov contain in its undergraduate level also courses under the category of Recommended Optional Courses. The author in the paper presents her experience with teaching Fun Mathematics. The content of the course is adjusted for the Moodle software environment to be utilised in e-learning.

Jan Długosz University of Częstochowa
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PRESENTATION SOFTWARE AND ITS USE IN TEACHING MATHEMATICS

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Abstract. The contribution is focused on different possibilities of using presentation software in teaching mathematics. Interesting topics which students presented through seminars are offered for muse in contribution. Contribution is further supplemented by demonstrations of students' solutions of concrete problems which were the topics of seminars from didactics of mathematics, with a view to various methods problem solving.

Jan Długosz University of Częstochowa
Scientific Issues, Mathematics XII, Częstochowa 2007

THE ROLE OF INTERACTION BETWEEN STUDENTS IN THE PROCESS OF DISCOVERING THE REGULARITY

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Abstract. In teaching mathematics, interactions between the teacher and the student and among students play a vital role. Through making students formulate and defend their points of view we develop in them their self-control. Thanks to it during solving problem a child is more responsible and conscious of what s/he does. Necessity of verbalization of executing activities and explanation of using procedures show that pupils are able to notice new things. The verbalization forces to look at the own work from a different perspective. In this paper I present a part of my research concerning discovering the regularity by 9-years old children. In this research I focused on mental process and interaction between the students.

Jan Długosz University of Częstochowa
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ABOUT DEFINITION OF A PERIODIC FUNCTION

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Abstract. In this paper we consider various definitions of a periodic function and establish connections between them, in particular, we prove equivalence of some of them. In papers and textbooks one can find different definitions of a periodic function. This raises the question which of them are equivalent.

Jan Długosz University of Częstochowa
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GEOMETRY AT PRIMARY SCHOOL

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Abstract. Geometry is an essential part of primary stage mathematics curriculum. Its syllabus and performance standards exactly define what a pupil should master after completing each year of primary stage of education. In our survey we mapped real outcomes of mastering key terms from geometry by pupils after their completion of primary stage. The survey also includes a comparison of views held by both primary education teachers and secondary junior stage teachers of mathematics on some issues of concern when teaching geometry in primary & junior school age.

Jan Długosz University of Częstochowa
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A VIEW FROM ABOVE OR RATHER FROM BELOW?

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Abstract. Abilities of every individual form the basis of spatial intelligence. They help him to perceive the visual world accurately, to transform perceptions, to manipulate perceptions in his mind and to modify his initial perceptions. They also enable the individual to create images in his mind from his own visual perception at the time when no external stimuli take effect. Spatial intelligence consists of a larger number of loosely connected abilities such as the ability to perceive things visually, draw a given shape, the ability to create mental images and to work with them and transform one shape into another.

Jan Długosz University of Częstochowa
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CONSTRUCTION PROBLEMS AND THEIR PLACE IN SECONDARY SCHOOL MATHEMATICS

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Abstract.

A pilot study concerning construction problems in mathematics teaching at grammar schools and universities is described in this paper.

Jan Długosz University of Częstochowa
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ON MISTAKES CONNECTED WITH DIFFERENTIATING

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Abstract. Many students have problems with solving tasks concerning the existence of the derivative of a function at a point. In this paper we discuss some of them.

Jan Długosz University of Częstochowa
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ICT TO ASSIST MATH TEACHING AT PRIMARY SCGHOOLS

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Abstract. Maths teaching has some specific features in comparison with other subjects taught. It is abstract and realistic, accurate and logical and it has its philosophy. Therefore teaching maths requires a more personalised approach, including highly motivating elements. This, in particular, applies at Primary Schools, as the attitude of children to maths is formed at this level of education. It is about the active involvement and creativity of children, which in turn requires a creative approach to teaching by the teacher. The teaching process can be suitably complemented by using up-to-date information and communication technology. In addition to professional teaching programmes developed by specialists, the teacher can apply a different approach by using commonly used software for developing his/her own teaching programmes.

Jan Długosz University of Częstochowa
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THE USE OF TRIAL EXAMS RESULTS FOR COMPARISON OF CHANGES OVER 2005 AND 2006

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Abstract. A few years ago preparing and coneching cesed to be the responsibility of individual schools. The range of knowledge and skills written in the "Basis Program" and "Standards" have not changed since then. For obvious reasons exam papers are different every year. Hence, there is no way of obtaining answers for the changes that have been happening over a period of time. International PISA research showed that in Poland there was a major increase in knowledge and skills of fifteen year olds between 2000 and 2003 [5]. I have been conducting trial exams for six years in Łódź. For the first few years The College of Computer Science was the organizer, currently it is Academy of Humanities and Economics in Łódź [3,4]. Every year more than 2000 students attend these trial exams. The 2005 and 2006 exam papers were redone with some small changes. In the work I am going to analyse the results of these tests and apply to changes over 2005 and 2006.

Jan Długosz University of Częstochowa
Scientific Issues, Mathematics XII, Częstochowa 2007

GEOMETRICAL ACTIVITIES AS A TOOL FOR STIMULATING MATHEMATICAL THINKING OF 4-7 YEARS OLD CHILDREN

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Abstract. In the constructivist approach to teaching mathematics, great emphasis is put on the way how children use the language. Talking during lesson is perceived from two different perspectives: as the tool for communication (social function) and - as the tool for shaping and determining the thinking process. Talk is not a result of a fully developed thought - although is created through a course of word statement.

Jan Długosz University of Częstochowa
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USING NON-GRAPHICAL PROGRAMS FOR TEACHING MATHEMATICS (SPECIALIZED FOR GEOMETRY)

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Abstract. The paper deals with the possibilities of drawing the figures with program Microsoft Office Word 2003. Some advantages and disadvantages of using graphical and non-graphical programs for educational goals are mentioned. The built-in automatic shapes in program MS Office Word 2003 are described and all presented figures of geometric objects are created in it.

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Why Logarithms ?

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Abstract

In 16th and 17th century, the need for speed in complex calculation spurred the invention of a powerful mathematical tool known as LOGARITHM. The reduction of multiplication and division to addition and subtraction (likewise the reduction of a complex mathematical structure to more simple ones) is in the spirit of "prosthaphaeretic rules" of ancient Greeks. We discuss some mathematical ideas related to logarithms and present some historical notes.

Jan Długosz University of Częstochowa
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STOCHASTIC GRAPHS AND THEIR APPLICATIONS

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Abstract. The article deals with one example of so called stochastic graph. The paper demonstrates some of possible applications of stochastic graphs in practice using the well known example about seven brigdes of the town of Königsberg.

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CLASSIFICATION OF PRIMARY SCHOOL TEACHERS ACCORDING TO THEIR ATTITUDES TO ICT EDUCATIONAL IMPLEMENTATION

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Abstract. The contribution deals with preliminary results of *Attitudes towards Computer Assistant Teaching* (abbr. as "ATCAT") research into the issue of educational implementation of ICT tools in the primary school context. In this respect, I focus on primary mathematics. The model of teacher development with respect to the level of ICT implementation (the ACOT research) is given as a theoretical base of the presented classification of teachers according to their attitudes to utilising computers when teaching primary mathematics.

Jan Długosz University of Częstochowa
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MODULO ARITHMETIC AND MODULO DESIGN

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Abstract. This paper deals with one application of Modular Arithmetic intended to students of secondary schools. The method of creating so called modulo designs by means of modulo numbers is shown. The designs can be created by means of the Cabri Geometry. This access enables pupils to develop effectively their creative thinking within not only mathematics.