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The work was submitted to international scientific conference «Problems and experience in implementing the Bologna Accords», Budva, Montenegro, June 17-24, 2009. Came to the editorial office on 30.04.2009.

COMPUTER ALGEBRA SYSTEM AND THE MATHEMATICAL TRAINING FOR STUDENTS OF TECHNICAL HIGH SCHOOLS IN RUSSIA

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I. Introduction. This paper is based on results of article [1]. As noted in the book [2], international competition, the increasing numbers of experienced and high quality requirements compel to automate owners the design and manufacture. Modern enterprises are unable to survive in the global competition if they do not produce new products of better quality, lower cost and in less time.

These words are fair and in the preparation of technical specialists. As it follows from the article [3], with the introduction in 1992 multilevel system of higher education problem of entering to the education system begin is solved. This system adopted in many countries around the world. Earlier the specialists with diploma were issued in 5-6 years, i.e. there was an one-stage scheme.

And now the scheme is multistage. Many state high schools both prepared and prepare specialists only. Some high schools, except for the traditional scheme, have also the multilevel scheme. Till now intensity in a question of prestige of the bachelor's degree is kept. Employers are not always wanted to take they for the job. There is a difference in programs of training. Specialists are prepared on a concrete specialty, as though in unique area. Programs of a bachelor degree have general scientific and general professional character. The bachelor receives fundamental preparation without any narrow specialization and spends for training only 4 years. Not belittling advantages of preparation of specialists, we shall tell on advantages of preparation of bachelors in our country.

The first advantage becomes more and more actual in modern Russia. The person receives the diploma and finds economic independence in 4 years after receipt in high school. Further, fundamentality of preparation, its general training allows to replace a job easily if necessary. From here one more advantage follows. For office work person is needed in next qualifications: formed person, able to work with the information, with the people, capable to prepare every possible documents.

II. Computer algebra systems. (CAS) The rapid development of all computer mathematical applications [4] led to a paradoxical situation is not yet properly assessed. On the one hand, the computer solutions are faster. Analytical computation of many standard, but cumbersome problems can no longer be regarded as rational. On the other hand, the computer solutions are not accepted as full. We want to show the advantage of an integrated approach in studying the foundations of higher mathematics of students technical skills. If there is a possibility, we get the solution of mathematical problems with CAS. The proof of the correctness of the solution we carry out analytically in the first stage. When you experience the connection of computer solutions and analytical evidence, it is possible to carry out the proof with CAS, or a combination of CAS and analysis. But the final word always rests with the person. About the transition from technical problem to the mathematical model it is detailed in [5].

III. Examples of applications.

1. Fundamentals of Algebra. You can obtain the solution of linear algebraic systems of equations with a computer. Then you can obtain the values of residuals vector solutions analytically or with a computer.

2. Mathematical Analysis. You get more convenient initial solutions of tasks to the limits, the point of break and continuity of functions, graph functions, calculate the sums of convergent series and infinite products with CAS. Then you get a rigorous mathematical solution. The next, you will again receive computer solutions based on analytical solutions already found. Calculation of indefinite and definite integrals is difficult, not only among students but also professionals, especially when it is required to obtain an analytical solution. CAS simply are irreplaceabled in this problem. Initially, you receive analytic solution with CAS (assuming it exists). Then, using the inverse operation of integration, i.e. on the basis of differentiation you sure the correctness of the obtained solutions.

Particular technical difficulties (laboriousness and the time spent) are the decision of the initial and boundary value problems for differential equations. In this case you can be recommended the following scheme solutions. Initially you apply the theorem of existence and the theorem of uniqueness of the solution if the problem is allowed. Then you define the required solution on the basis of CAS. The third stage is linked to the verification of the obtained solutions. This verification can be analytical or using CAS.

3. Linear Programming. The traditional problems of linear programming, such as canonical form,

production planning optimization, diet problem, in terms of the principles set forth in [2], it is easier and much faster to solve using the computer. The proof of the correctness of the obtained solutions can be made as follows. You can do the final operation of the simplex method for obtained computer solutions: check compliance with a criterion of extreme solutions to the objective function. The same is applied to the transport problem. You can use one of the methods for solving the transport problem to optimal computer solutions.

You can find more information about the problems in this article at the personal site *http://nit21-eng.narod.ru*.

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The work was submitted to to the International Scientific Conference «Higher professional education. modern aspects of the international cooperation», Tel Aviv, May 1-7, 2009. Came to the editorial office on 31.03.2009.