

APPLICATION FOR SOLVING HOMOGENOUS ORDINARY DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS

Bakhtiyor Zokhirovich Usmonov

Chirchik State Pedagogical University Senior Teacher of the
"Methodology of Mathematics and Geometry" Department
E-mail: bakhtiyer.usmanov@mail.ru

Abstract

The article is dedicated to examples of the purposeful use of modern information technology tools, in particular, the use of mathematical packages, in order to increase the effectiveness of mathematics practical lessons.

Keywords: Information technologies, program, Maple, Desmos, Geogebra, graph, function.

Introduction

In the era of globalization, rapid development of techniques and technologies, and the introduction of new, modern techniques and technologies into production, there is a great need for high-potential personnel. Because the scientific and technical development and global competitiveness of any country depends on the level of development of education [12]. The activity of the student has a unique creative character, and he must have the competencies to make innovative and non-standard decisions on the creation of new techniques and technologies, introduction to production, organization and management of production. Undoubtedly, the training of such high-potential personnel is directly related to the development of the country's science. The development of education and science in Uzbekistan, the training of qualified and potential specialists are among the most priority directions of the reforms carried out in the country [1-6]. One of the documents defining the near and future development of the country, the new development strategy of Uzbekistan, also defines a number of tasks for the development of the education system and science [1].

According to the analysis of the competency requirements for modern personnel and our research, the future engineer has deep knowledge and skills in his specialty, as well as logical mathematical thinking, the ability to apply mathematical knowledge, mathematical equipment, mathematical methods to his field, and mathematical modeling of engineering issues. should be [9-12]. An engineer is required to have sufficient mathematical knowledge and skills in order to have the competence components listed above.

In today's globalization, increased and accelerated flow of information, information communications, high-precision automatic devices, as well as the rapid development and updating of science, techniques and technologies, the mathematical apparatus, mathematical methods, mathematical modeling and design are of great importance in obtaining accurate and rapid technical and technological solutions. That is why engineers are being trained the role of mathematics and subjects in the cycle of mathematics is of great importance, and improving the quality and efficiency of their education is considered an urgent issue. Raising



mathematics education to a higher level in the Republic of Uzbekistan, i.e. increasing the quality and effectiveness of teaching mathematics and developing the science of mathematics and its applications, is defined as one of the main tasks [7,8].

are some problems identified by the authors in the course of research on the teaching of mathematics, which is of great importance in modern education, innovative approaches to increase the quality and efficiency of teaching science, and the results of pedagogical tests and experiments.

ODTs in Maple solve for dsolve function

ODTs in Maple solve for **dsolve** from the function is used . Command common appearance as follows :

1) **dsolve (ODE);** where ODE is ODT;

2) **dsolve (ODE,y (x), extra_arg);**

where $y(x)$ is in the ODE unknown function , **extra_arg** – condition didn't happen parameters . These are the parameters instead of , mostly Koshi the issue is borderline issues when unwrapped , approx the solution when found necessary sentences is placed .

Koshi issue initial a must

1 – orderly of ODT solutions from among $y(x_0) = y_0$ condition satisfying the solution to determine **Koshi issue** , $y(x_0) = y_0$ condition while **initial a must** is called In the Maple environment ODTs for placed Koshi the issue solve opportunity there is is , of the command common appearance as follows : > **dsolve ({ ODT,y (a)=b},y(x));**
or > **dsolve ({ ODT,y (a)=b});**

An example

Immutable coefficient one sexual simple differential equations Maple practical in solving program from the help we use of our equation appearance as follows $y'' + 2y' + 5y = 0$; Maple language we turn

>ode := diff (y(x), x\$2) + 2·diff (y(x), x) + 5·y(x) = 0;

the maple math of our equation in the package writing mathematician writing

$$\frac{d^2}{dx^2} y(x) + 2 \left(\frac{d}{dx} y(x) \right) + 5 y(x) = 0$$

we count and result we will reach

dsolve(%);

$$y(x) = _C1 e^{-x} \sin(2x) + _C2 e^{-x} \cos(2x)$$

graph drawing for private the solution we find need and $y(\pi) = 0$, $y\left(\frac{\pi}{2}\right) = 1$ value we give values by entering we can

ex := y(Pi) = 0, D(y)\left(\frac{Pi}{2}\right) = 2;

$$y(\pi) = 0, D(y)\left(\frac{1}{2} \pi\right) = 2$$



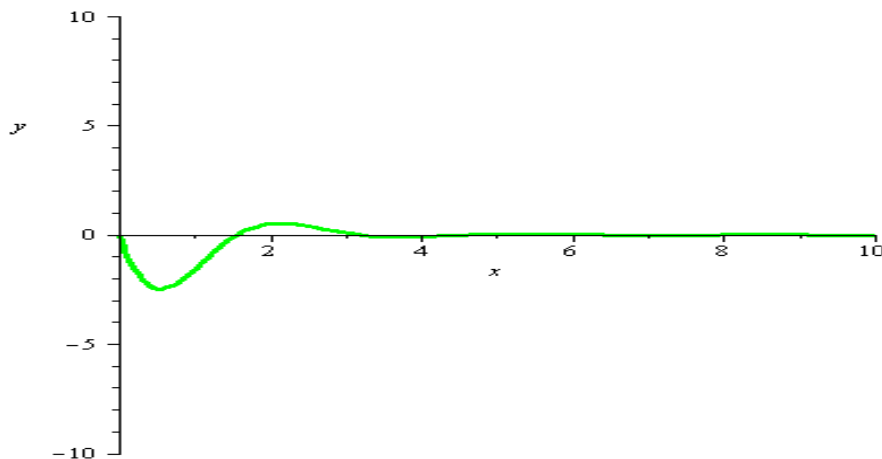
values to Eq leave counting private the solution we find

`dsolve({ode, ex}, y(x));`

$$y(x) = -\frac{e^{-x} \sin(2x)}{e^{-\frac{1}{2}\pi}}$$

and plot command i into our solution we enter and to the graph abscissa to the intermediate we give

`plot` $\left(-\frac{e^{-x} \sin(2x)}{e^{-\frac{1}{2}\pi}}, x = 0..10, y = -10..10, color = green, thickness = 3 \right);$



An example

`ode := diff(y(x), x$2) + 6*diff(y(x), x) + 9 y(x) = 0;`

the maple math of our equation in the package writing mathematician writing

$$\frac{d^2}{dx^2} y(x) + 6 \left(\frac{d}{dx} y(x) \right) + 9 y(x) = 0$$

`dsolve(%);`

$$y(x) = _C1 e^{-3x} + _C2 e^{-3x} x$$

`ex := y(0) = 1, D(y) \left(-\frac{1}{3} \right) = 2;`

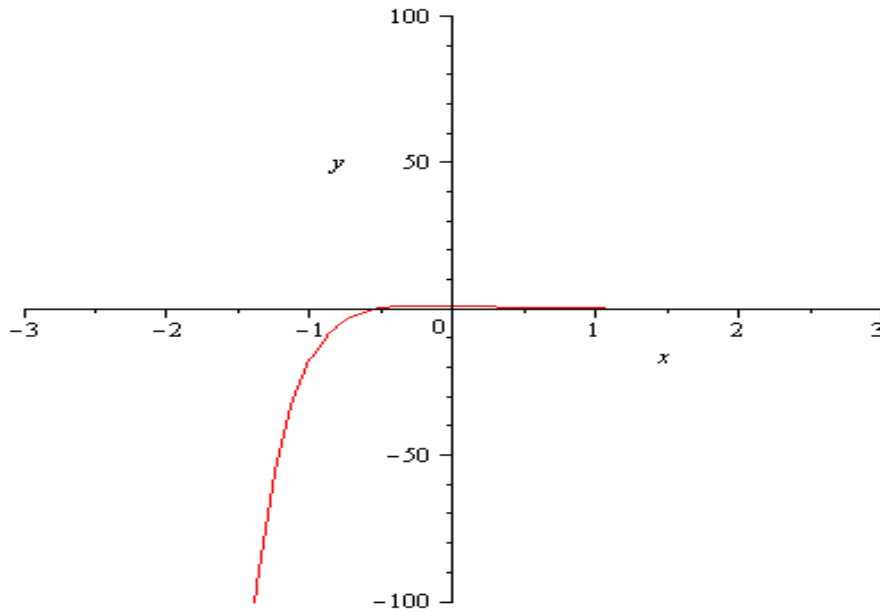
$$y(0) = 1, D(y) \left(-\frac{1}{3} \right) = 2$$

`dsolve({ode, ex}, y(x));`

$$y(x) = e^{-3x} + \frac{1}{2} \frac{(2 + 3e) e^{-3x} x}{e}$$



`plot(e-3x + 1/2 * (2 + 3e) * e-3x / e, x = -3..3, y = -100..100);`



An example . `ode := diff(y(x), x$2) + 10*diff(y(x), x) + 6*y(x) = 0;`

$$\frac{d^2}{dx^2} y(x) + 10 \left(\frac{d}{dx} y(x) \right) + 6y(x) = 0$$

`dsolve(%);`

$$y(x) = _C1 e^{(-5 + \sqrt{19})x} + _C2 e^{-(5 + \sqrt{19})x}$$

`ex := y(0) = 0, D(y)(1) = 1;`

$$y(0) = 0, D(y)(1) = 1$$

`dsolve({ode, ex}, y(x));`

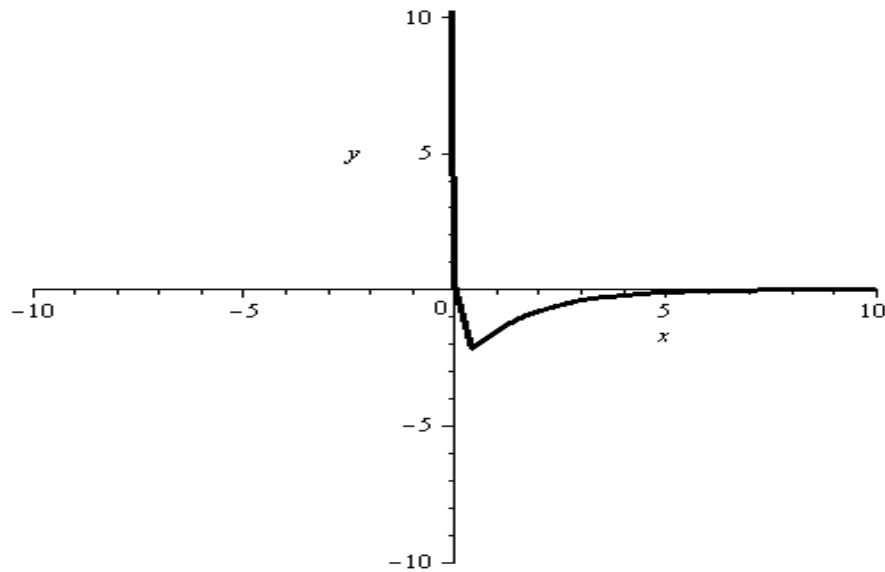
$$y(x) = \frac{1}{2} \frac{(5 + \sqrt{19}) e^{(-5 + \sqrt{19})x}}{-3 e^{-5 + \sqrt{19}} + 22 e^{-5 - \sqrt{19}} + 5 e^{-5 - \sqrt{19}} \sqrt{19}} - \frac{1}{2} \frac{(5 + \sqrt{19}) e^{-(5 + \sqrt{19})x}}{-3 e^{-5 + \sqrt{19}} + 22 e^{-5 - \sqrt{19}} + 5 e^{-5 - \sqrt{19}} \sqrt{19}}$$

`plot(1/2 * (5 + sqrt(19)) * e(-5 + sqrt(19))x / (-3 e-5 + sqrt(19) + 22 e-5 - sqrt(19) + 5 e-5 - sqrt(19) sqrt(19)) - 1/2 * (5 + sqrt(19)) * e-(5 + sqrt(19))x / (-3 e-5 + sqrt(19) + 22 e-5 - sqrt(19) + 5 e-5 - sqrt(19) sqrt(19)), x =`

`-10..10, y = -10..10, color = black, thickness = 3, title`

`= MARJONA`);





CONCLUSION

In short, today's students want to solve their problems quickly and qualitatively. In higher educational institutions, schools, teaching mathematics with the help of information technology has a good effect. If we pay attention to the world, we can see that the transition from theoretical education to practical education is rapidly developing. Therefore, it is necessary to pay a lot of attention to the use of information technologies to increase the effectiveness of practical training in teaching mathematics in higher educational institutions and schools. Maple, geogebra, desmos programs will help us in this. It is very useful in making students interested in the fact that mathematics is the basis of excellent learning in all specialties.

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