Study on the Solutions of Unconstrained Optimization Problems and Nonlinear Equations

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Keywords: Binary First Order Equations, Solution Ideas, Elimination

Abstract: In the second chapter of mathematics, the contents of the study are "binary first order equations ". The teaching material is arranged as follows: the mathematical concept of binary first order equations, the idea of solving binary first order equations, and the practical application of binary first order equations. Based on the syllabus of Hunan Education Edition, this paper aims to cultivate the students' good thinking of eliminating elements and promote the teaching process of binary first order equations.

1. Introduction

There are two ways to solve the problem of first-order variational equations: one is to replace the elimination method, to increase and cancel the elimination method [1-4]; the other is that in the actual junior high school mathematics process, there is no absolute educational order between the two methods. In order to cultivate students' good mathematical thinking, to exercise students' correct elimination concept, to solve practical problems, to cancel mathematical thinking is beneficial to students' ability to solve problems and to become the basis of formulating courses[5-6].

2. A Mathematical Concept of Binary First-order Equation Set

There are many unknown things in life that involve a particular field and a particular thing, This is a universal phenomenon; There is a certain quantitative relationship between unknown data; By enumerating quantitative relationships, we can get the necessary information. The total number of feet and the total number of heads in the cage are given in the N of the same cage m to calculate the number of chickens and rabbits. The same cage is a typical binary first order solution, If the number of chickens is a; B, number of rabbits Group: a=B=m,9312 n;93132A+4 B= and 4 The solution :9312, result and simplify the relationship again. Methods 1:2 A+4215; =n,(M-A) m-2A=n;4 Because M, n are known numbers, A A value can be obtained; b values can be obtained using formula 1; Method 2:2215; +4 B=n,(M-b) 2 m+2 B=M, A and b values can use the relationship between two unknowns to implement the elimination process, Simplify mathematical relationships, Get the information you need, so as to obtain the central mathematical concept of the first order variational equations.

$$x_i^{k+1} = x_i^k - \omega \frac{f_i(x_1^{k+1},\cdots,x_{i-1}^{k+1},x_i^k,\cdots,x_n^k)}{\partial_i f_i(x_1^{k+1},\cdots,x_{i-1}^{k+1},x_i^k,\cdots,x_n^k)}$$
$$(i = 1,2,\cdots,n; \quad k = 0,1,\cdots),$$

Figure 1 Nonlinear equations

  DOI: 10.25236/cseem.2020.120

3. Exploration of Multiple Solutions to Binary First Order Equations

3.1. Teaching Design of Binary First order Equations

The main contents include: binary first order equations, integral multiplication, factorization, parallel line and intersecting line, axisymmetric problem, data analysis; in this teaching design, the core position of binary first order equations is fully defined; the mathematics courses before the mathematical knowledge of binary first order equations are all laying the groundwork for binary first order equations, training students' mathematical logic thinking and improving students' understanding of binary first order equations; The contents of mathematics knowledge before binary first order equations are as follows: first order inequality system, using first order equation to introduce binary first order equations for students, to establish students' good mathematical logic; in the first volume of seventh grade, the mathematical knowledge of algebraic formula lays a good foundation for students to solve binary first order equations; using algebraic mathematical thought, introducing the concept of elimination mathematics, improving students' understanding of elimination elements, and promoting the smooth completion of teaching of binary first order equations. Mathematics knowledge has certain logic, mathematics learning is a spiral rising experience; reasonable planning of teaching content, promote junior high school students to obtain excellent mathematics results, so that mathematics teaching with half the effort.

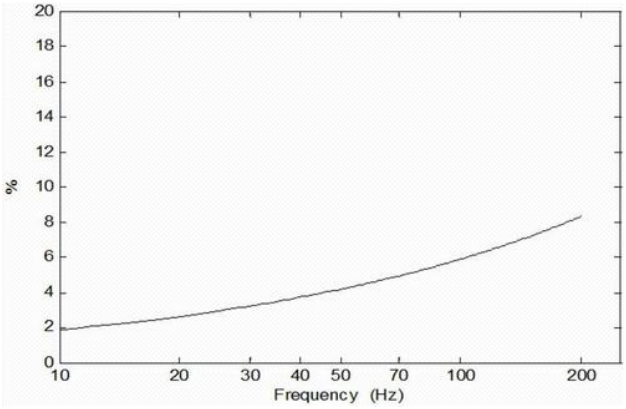

Figure 2 Nonlinear equations

3.2. Problem Solving Process of Binary First Order Equations

First, In the elimination method, It's a mathematical thought, To calculate mathematical problems, It belongs to the simplified application of Gaussian elimination method. The idea of solving the problem by substitution elimination method is :2 unknowns in the binary first order equations, x、y, The x is expressed in y, Or x y,. To achieve elimination, Get the solution of unknown number; As in the case of chicken and rabbit, The number of chickens is b, a、 the number of rabbits a+b=m, The concrete manifestation of substitution elimination method is :2 a+4×(m-a) b=n;2×(m-b)+4 By substituting elimination, The binary first order equations are simplified to the first order equations, Reduce the difficulty, Get the answers.

Second, the addition and subtraction elimination method is a way of mathematical operation; in two binary first order equations, the coefficient of the same unknown number is judged, and the elimination goal is realized by the addition and subtraction of the equations, and the binary first order equations are simplified into one order equations.

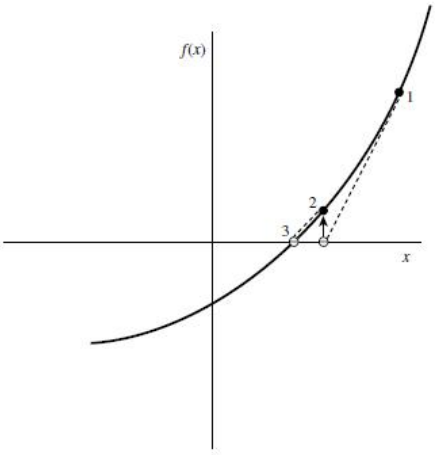

Figure 3 Nonlinear equations

Case 1, Using substitution elimination method to solve binary first order equations :13 x+5 y=21, The process x-5y= solving the problem is :1+2, The equations are derived :(3 x+5 y)+(2 x-5y)21(-11); Mathematical simplification :5 x=10, x=2; Generating x=2 into equation 1, ×2+5 y=21, 5 y=15, Calculated y=3; Get the solution of the equations: x=2, y=3. In this case, x=2 can also be substituted into equation 2, Get results.

Case 2, For solving binary first order equations with addition and subtraction elimination method :1 2 x-5y=7, 2 2 x-3y=1. The process of solving the problem is :2-1, Obtain equations :(2 x-5y)-(2x-3y)=-1+7; Mathematical simplification :8 y=-8, From this we can see: y=-1; Generating y=1 into equation 1, 2 x+5=7, Calculated x=1; Get the solution of the equations: x=1, y=1.

Case 3, Select the appropriate way to solve the binary first order equations :12 x+3 y=12, The process x+ solving the problem is :1×3, Obtain equations :3,6 x+9 y=36; ②×2, Obtain equations :46 x+8 y=34; Calculate 3-4, The equations are derived :(6 x+9 y)-(6 x+8)=36-34; Mathematical simplification: y=2; y=2 into 1, Access to x=3; Get the solution of the equations: x=3, y=2.

Third, through the case analysis, we can see that the addition and subtraction elimination method is the process of realizing the elimination of unknowns through the operation between the equations, calculating the result of one of the unknowns, and then obtaining the solution of the equations. If there is no interrelation between the coefficients, the two equations are multiplied by one coefficient of the other unknown number, and the absolute values of the coefficients of the two equations are equal.

Fourth, the calculation principle of substitution elimination method and addition and subtraction elimination method is to simplify the difficulty coefficient of binary first order equations and realize the process of solving binary first order equations. In the case of chicken and rabbit in the same cage, the advantage of substitution elimination method is that the elimination process is realized by using the relationship between two unknowns. From the point of view of mathematics learning, the two ways of eliminating elements are not to cultivate students' good mathematical thinking, which is helpful to exercise their logical thinking ability.

4. Create Life Situations and be Good at Expressing his Own Mathematical Thoughts

Students' understanding of mathematics comes from life, and the basic concepts of mathematics are all abstracted effectively based on the reality of students' life. Life situations can put students in it, further awaken students' desire for inquiry, urge students to realize the practical solution of these problems, and can not simply rely on the mathematics textbooks or the ready-made answers explained by teachers. Students should be allowed to combine their interests and hobbies, reasonably design the actual life background, and urge students to realize the practicability of the application of mathematical knowledge in life inquiry, actively participate in problem solving, and think positively, be good at discovery, express their own opinions and effectively grasp the

mathematical knowledge and mathematical ideas behind it.

In the teaching of binary first order equations, we pay attention to the concept of binary first order equations, and with the help of life situation: A is 20 small books less than B, later A lost 5 small books, B bought 11 new small books, then B small book is twice as much as A. Ask the original A and B each have how many small painting books? Guide students to think and explore, students from the above situation to find equal relations, let A and B each have x, y small painting book, will get binary first order equations.

Feel and grasp the basic characteristics of binary first order equations: the equations should be composed of two binary first order equations with the same unknown number, and further achieve the method of cultivating students' ideas of equations.

5. Put the Cultivation of Students' Mathematical Thinking in the Open Teaching Situation

Therefore, teachers are good at grasping and making full use of the life problems generated by classroom dynamics in this process, as an opportunity to further develop students' mathematical potential, make rational use of students' mathematical learning resources, and guide students to stimulate students' mathematical emotions and promote students' mathematical wisdom to grow.

such as known X=2, yX=5, let the students write the binary first order equation, urge the absolute value to satisfy a solution of this equation, and let the students write a system of binary first order equations, and urge this pair of values to be the solution that satisfies this system of equations. To guide students to overcome the qualitative thinking, understand the difference between binary first order equation and binary first order equation system, through the creation of open life situation, to urge students to move from passive learning to active learning, and to realize the communication in the real sense of mathematics classroom learning.

6. Life Problems In-Depth Thinking Can not be Separated from Students' Doubts about Mathematics Problems

In classroom teaching, teachers should pay attention to creating a harmonious classroom atmosphere, let students think deeply and question deeply, dare to break the routine, put forward their own questions, let different students from different angles to think and answer substantive questions, only the student's answer is reasonable, can give positive affirmation, lead students' mathematical thinking to deeper, effectively cultivate students' inquiry spirit and inquiry habit, and expand students' rational thinking breadth and depth.

For example, a commodity can be sold at a 10% discount on the price of 20% profit; at a 20% discount can be sold at a profit of 10 yuan, ask the price of this commodity? Students combine their own life experience to put forward two problem-solving formulas, the first is profit = price-in-price, profit = in-price × profit margin (profit percentage), further strengthen students' understanding of binary first order equations, expand students' thinking, and clarify the characteristics of binary first order equations, so that students can understand more deeply and think more carefully in their study.

7. Conclusions

To sum up, binary first order equations are used to solve mathematical problems and have good application efficiency; extending mathematical problems to life is helpful to improve the life skills of junior high school students; using the concept of elimination mathematics to cultivate junior high school students' good mathematical thinking and to exercise their logical thinking ability is helpful to the development of core quality education. Therefore, junior high school mathematics teachers should pay attention to the teaching design of binary first order equations to promote students to achieve good results.

Acknowledgements

“2019 Jinzhong University Maker team research stage results” (jzxycktd2019035).

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