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TEACHING STUDENTS IN MATH CIRCLES TO SOLVE CERTAIN EQUATIONS BY BRINGING THEM INTO A SYSTEM OF EQUATIONS

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ANNOTATION

This article covers the methods of solving some equations by introducing them into a system of powerful equations equal to it, and provides examples of them.

Keywords;Trigonametry, equation, artificial, substitution,method. system of equations.

Mathematics circles, mathematics is the main type of extracurricular work. Circles are of interest to science in students and serve to improve their mathematical thinking, qualifications , quality of mathematical training. We will learn to solve some equations below by quoting them into a system of equations. This further increases the circle of thinking of students.

1. $f_1^2(x)+f_2^2(x)+...+f_k^2(x)=0$ or $|f_1(x)|+|f_2(x)|+...+|f_k(x)|=0$ solving equations in the form of.

$f_1^2(x)+f_2^2(x)+...+f_k^2(x)=0$ (1)

$|f_1^2(x)|+|f_2^2(x)|+...+|f_k(x)|=0$ (2)

equations in appearance

$\begin{cases} f_1(x)=0 \\ \vdots \\ f_k(x)=0 \end{cases}$ (3) strong equal to the system of equations.

Example 1. $x^4+5\cdot4^x+4x^2\cdot2^x-2\cdot2^x+1=0$ (4) solve the equation.

Solution. (4) we write the equation in the following form.

$(x^2+2\cdot2^x)^2+(2^x-1)^2=0$ (5)

From this (5) equation $\begin{cases} x^2+2\cdot2^x=0 \\ 2^x-1=0 \end{cases}$ (6) strong equal to the system of equations. (6)

Equation 2 of the system has a single solution, which does not satisfy the first equation of the system. As a result (6) the system does not have a solution

Example 2 $\sqrt{x^2-6x+9}+\sqrt{\log_{\frac{1}{7}}^2(x^2-4x+4)}=0$ (7) solve the equation.

Solution. (7) we write the equation in the following form.

$|x-3|+\left|\log_{\frac{1}{7}}(x^2-4x+4)\right|=0$

This equation is strong equal to the following system of equations.

$$\begin{cases} x-3=0 \\ \log_{\frac{1}{7}}(x^2-4x+4)=0 \end{cases} \quad (8)$$

This is the solution to the first of the equations . Verification indicates that this number is also a solution to the second equation. The result is the solution to the given equation (7).

J: $x=3$.

(3) let's look at a number of other equations that are brought into the system.

Example 3. $\log_2(1+\sqrt{x^4+x^2})+\log_2(1+x^2)=0$ (9) solve the equation.

Solution. For optional x

$$\begin{cases} \log_2(1+\sqrt{x^4+x^2})\geq 0 \\ \log_2(1+x^2)\geq 0 \end{cases}$$

inequalities are appropriate. Therefore, equation (9) is strong equal to the following system of equations.

$$\begin{cases} \log_2(1+\sqrt{x^4+x^2})=0 \\ \log_2(1+x^2)=0 \end{cases}$$

system single $x=0$ has a solution.

J: $x=0$.

2.Using the delimitation of the function.

If $f(x)=g(x)$ (10) when solving equations, a M all belonging to the collection x for

$f(x)\leq A$ va $g(x)\geq A$

if inequalities are appropriate, then M in a set (10), the equation is strong equal to the following system of equations.

$$\begin{cases} f(x)=A \\ g(x)=A \end{cases} \quad (11)$$

Example 4. $4x^2+4x+17=\dfrac{12}{x^2-x+1}$ solve the equation.

Solution. We write this equation in the following form.

$$\left(x+\frac{1}{2}\right)^2+4=\frac{3}{\left(x-\frac{1}{2}\right)^2+\frac{3}{4}} \quad (12)$$

as you can see, optional x for the real number

$$g(x)=\left(x+\frac{1}{2}\right)^2+4\geq 0; \quad f(x)=\frac{3}{\left(x-\frac{1}{2}\right)^2+\frac{3}{4}}\leq 4.$$

As a result, the equation (12) is strong equal to the following system of equations.

$$\begin{cases} \left(x+\frac{1}{2}\right)^2+4=4 \\ \left(x-\frac{1}{2}\right)^2+\frac{3}{4}=\frac{3}{4} \end{cases}.$$

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