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SECTION 1. Theoretical studies in math.
UDC 514

METHODS OF USING THE PARABOLA QUADRATIC EQUATIONS TO SOLVE A PARAMETER

***Abstract**: In this article it is shown that solving the quadratic equations with parametric quadratic functions is simpler than any other method, and can easily be absorbed by the students.*

***Key words**: Parameter, square function, root, parabola, inequality, graph, coordinate system, problem and solution.*

***Language**: English*

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Introduction

In this article, we have tried to show that the equation of square equations with parametric quadratic functions, ie parabola, is much simpler and easier to absorb from students. The relative position of the equation roots and the coordinate axis of the parabola was taken into account. By using this method, the solution to the problem is clearly defined by a drawing or graphic solution. We hope that giving this method to the general public will be a good result.

Materials and Methods

Brief Theoretical Data: Many paramagnetic equations belonging to square triangles are more convenient than solving them by other methods, depending on their position at the end of the axis. In this article, we have tried to study this subject in detail. We have looked at the method of solving such issues depending on the intermediate point of the square function. We use x_1 and x_2 a square function

$$f(x) = ax^2 + bx + c$$

with roots, its discriminant

$$D = b^2 - 4ac$$

and parabola point. The following are some of the properties:

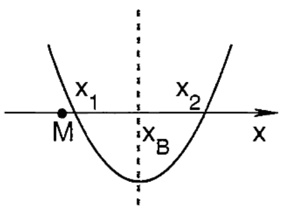
Properties-1: Both roots of the given

$$f(x) = ax^2 + bx + c$$

square function are for the case that is greater than M,

$$\begin{cases} x_1 > M \\ x_2 > M \end{cases} \Leftrightarrow \begin{cases} D \geq 0 \\ x_0 > M \\ a \cdot f(M) > 0 \end{cases}$$

relationships and the following scheme are appropriate.



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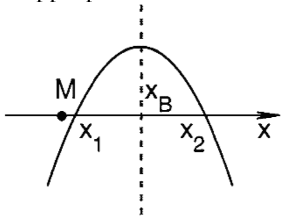

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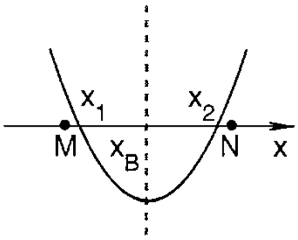
Properties-2: Both roots of a given

$$f(x)=ax^2+bx+c$$

square function are also (M; N) for the position located in the interval

$$x_1,x_2\in(M;N)\Leftrightarrow\begin{cases}D\geq 0\\ x_0\in(M;N)\\ a\cdot f(M)>0\\ a\cdot f(N)>0\end{cases}$$

relationships and the following scheme are appropriate.



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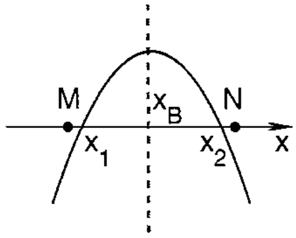

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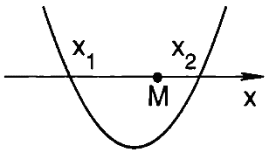
Properties-3: For a given position, M is the space between the roots of the

$$f(x)=ax^2+bx+c$$

square function

$$x_1<M<x_2 \quad\Leftrightarrow\quad a\cdot f(M)<0$$

relationships and the following scheme are appropriate.



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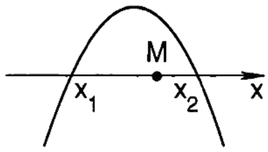

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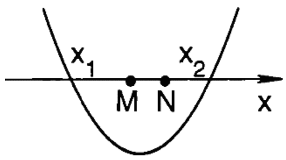
Properties-4: The given (M; N) interval is for the position located in the root of the

$$f(x)=ax^2+bx+c$$

square function

$$x_1<M<N<x_2 \quad\Leftrightarrow\quad \begin{cases}a\cdot f(M)<0\\ a\cdot f(N)<0\end{cases}$$

relationships and the following scheme are appropriate.



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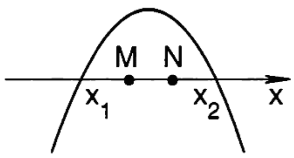

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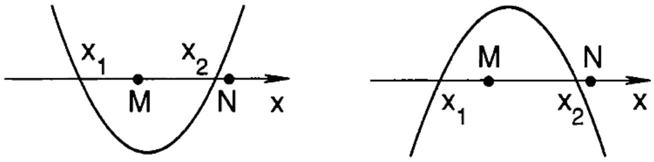
Properties-5: One of the roots of the given

$$f(x)=ax^2+bx+c$$

square function (M; N) separates the other roots from the interval to the left of the interval

$$x_1<M<x_2<\text{N} \quad\Leftrightarrow\quad \begin{cases}a\cdot f(M)<0\\ a\cdot f(N)>0\end{cases}$$

relationships and the following scheme are appropriate.



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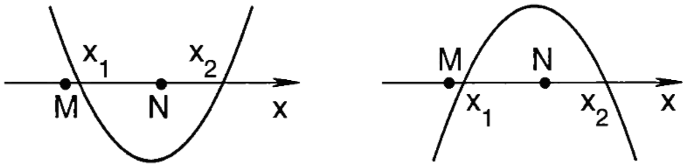
Properties-6: One of the roots of the given square function (M; N) separates the other roots from the interval to the right position

$$M < x_1 < N < x_2 \quad \Leftrightarrow \quad \begin{cases} a \cdot f(M) > 0 \\ a \cdot f(N) < 0 \end{cases}$$

relationships and the following scheme are appropriate.



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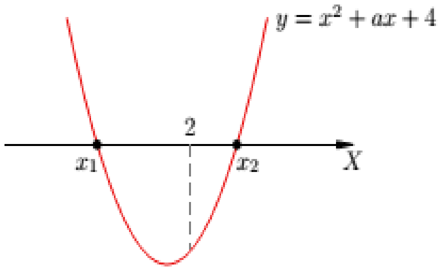
Practical results

Let's take a look at some of the solutions to the problem by using the square function graph. In this case, we want to point out that solving problems is easier than any other situation.

Problem-1: What values of the parameter *a* are one of the roots of the $x^2 + ax + 4 = 0$ quadratic equation is smaller than 2, and the second one is greater than 2.

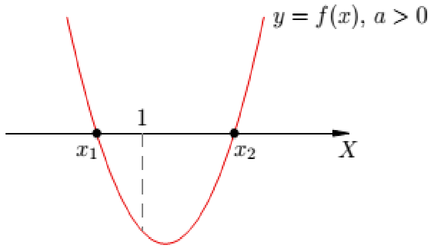
Solution: x_1 and x_2 the roots of given quadratic equations. Drawing on a case-law is a drawing.

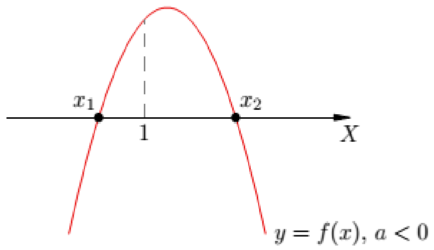


From this drawing it is clear that *f (2) <0*. Then, *f (2) = 4 + 2a + 4 <0*, and we get *a <-4* result.

Problem-2: In what values of parameter *a* one of the $ax^2 + 2x + 2a + 1 = 0$ quadratic equation rows is smaller than 1 and the other is greater than one.

Solution: The case is over. If *a>0*, the parabola branches are upward, *f(1)<0*, and if *a<0* then *f (1)> 0*. For the two cases, draw the following graph.

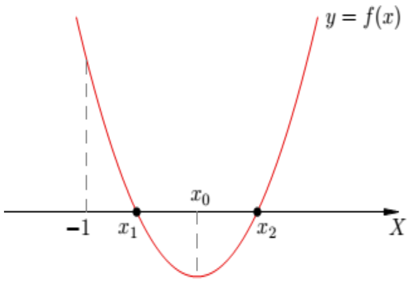




Since the case *a>0* and *f(1)<0*, and case 2 holds for *a<0* and *f(1)>0*, we can write $a \cdot f(1) < 0$ a general inequality for both cases. In this case, $a(3a+3) < 0 \Leftrightarrow -1 < a < 0$ we get the result. The answer is: $a \in (-1;0)$.

Problem-3: The values of parameter a vary in the roots of the $x^2 + 2(a-2)x - 4a + 5 = 0$ equation and the two values are greater than -1.

Solution: We also use the above idea. We do not calculate the roots of the equations, the condition of the case is that the equation roots are lying -1 the right axis from the right axis. Taking this into consideration, we draw the drawing on the terms of the case:



Based on the experience gained from solving the above issues, we can write the following statements:

$$\begin{cases} D > 0 \\ f(-1) > 0 \\ x_0 > -1 \end{cases} \Rightarrow \begin{cases} 4(a-2)^2 + 4(4a-5) > 0 \\ 1 - 2a + 4 - 4a + 5 > 0 \\ 2 - a > -1 \end{cases} \Rightarrow \begin{cases} a^2 - 1 > 0 \\ a < \dfrac{5}{3} \\ a < 3 \end{cases} \Rightarrow \begin{cases} a > 1 \text{ yoki } a < -1 \\ a < \dfrac{5}{3} \\ a < 3 \end{cases}$$

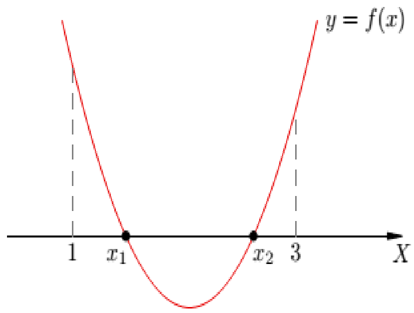
The answer is: $(-\infty;-1) \cup \left(1;\dfrac{5}{3}\right)$.

Problem-4: What values of the parameter *a* lies in the roots of the $x^2 + ax + 4 = 0$ equation (1; 3)?

Solution: Give

$$f(x) = x^2 + ax + 4$$

a function. Draw a drawing on a case-law.



As shown in the drawing, the f (x) square rows are between 1 and 3, in that case

$$\begin{cases} D \ge 0 \\ f(1) > 0 \\ f(3) > 0 \\ 1 < x_0 < 3 \end{cases} \Rightarrow \begin{cases} a^2 - 16 \ge 0 \\ a + 5 > 0 \\ 3a + 13 > 0 \\ 1 < -\dfrac{a}{2} < 3 \end{cases} \Rightarrow \begin{cases} a \ge 4 \text{ yoki } a \le -4 \\ a > -5 \\ a > -\dfrac{13}{3} \\ -6 < a < -2 \end{cases}$$

The relationship system will be appropriate.

From now on $a \in \left(-\frac{13}{3}; -4\right]$ we find that.

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