Next Scientists
European International Journal of Pedagogics

TYPE Original Research
PAGE NO. 107-108
DOI 10.55640/eijp-05-12-26

Solving Inequalities With The Unknown Under The Square Root

Mamaraimov Bekzod Kadirovich

Teacher of mathematics at Terdu Academic Lyceum, Uzbekistan

MakhmudoV Azam Kudratovich

Teacher of mathematics at Terdu Academic Lyceum, Uzbekistan

Musurmonov Maruf Akrom oglu

Teacher of mathematics at Terdu Academic Lyceum, Uzbekistan

OPEN ACCESS

SUBMITTED 30 October 2025
ACCEPTED 25 November 2025
PUBLISHED 31 December 2025
VOLUME Vol.05 Issue12 2025

Abstract: Irrational inequalities are one of the important sections of algebra, studying inequalities involving radical expressions. When solving such inequalities, it is important to take into account conditions such as the domain of the expression and the non-negativity of the expression under the root. This article describes in detail the concept of irrational inequalities, their types, methods of solution, and rules necessary to avoid errors. Also, effective methods such as squaring inequalities, the method of intervals, and the functional approach are explained with examples. Irrational inequalities serve to develop logical thinking in mathematics and are an important theoretical basis for solving complex algebraic problems.

Keywords: Irrational inequality, expression with roots, domain of definition, inequality solution, squaring metho, interval method, algebra, logical analysis.

Introduction: In mathematics, the topic of inequalities is important and is widely used in solving various algebraic problems. Irrational inequalities, which are a special type of inequalities, contain expressions with roots. Solving such inequalities is more complicated than simple inequalities and requires special rules and caution. Studying irrational inequalities develops students' logical thinking and strengthens mathematical analysis skills.

Irrational inequalities are inequalities that involve square roots, cube roots, or roots of other degrees. For example, inequalities such as $\sqrt{(x - 2)} > 3$ or $\sqrt{(2x + 1)} \le x$ are examples of irrational inequalities. When solving such inequalities, the first condition is that the expression under the root is not negative.[]1

One of the most important steps in solving irrational inequalities is finding the domain of definition. Because the expression under the root of an even degree cannot be negative. For example, for the expression $\sqrt{(x - 2)}$ to exist, $x - 2 \geq 0$ must be true. If this condition is not met, the inequality has no solution.[2]

There are several effective methods for solving irrational inequalities.

1. Squaring method. In this method, both sides of the inequality are squared. However, additional roots may appear in this process, so it is necessary to check the final result with the domain of definition. For example, in the inequality $\sqrt{x} > 2$, squaring leads to the result $x > 4$.

2. Interval method. This method is based on reducing the inequality to zero and determining the sign of the expression. The points at which the expression under the root is zero are determined and the intervals on the number line are checked.

3. Functional approach. In this method, the left and right sides of the inequality are considered as functions and the solution is determined using their graphs. This method is used more often for complex inequalities.[3]

The following mistakes are often made when solving irrational inequalities:

Not taking into account the domain of determination

Not checking the result obtained after squaring

Incorrectly evaluating the sign of the expression under the root

To avoid these mistakes, it is necessary to carefully analyze each step in the solution process.

Irrational inequalities are found not only in theoretical algebra problems, but also in the fields of physics, economics, and engineering. For example, expressions with roots may appear in problems related to distance, time, speed, or energy. Therefore, the ability to solve irrational inequalities is important in analyzing practical problems.

Example

Solve the inequality $\sqrt{(x + 1)} \geq 2$.

Domain of determination: $x + 1 \geq 0 \rightarrow x \geq -1$

Square: $x + 1 \geq 4$

$x \geq 3$

Solution: $x \geq 3$

CONCLUSION

In conclusion, Irrational inequalities are one of the complex but important sections of algebra. In the process of solving them, it is of particular importance to correctly determine the domain of determination and verify the result. Deep mastery of this topic develops students' logical thinking and increases mathematical literacy.

REFERENCES

1. Kiselev A.P. Algebra asoslari. – Moskva: Nauka, 2011. – 180–195-betlar.
2. Sharygin I.F. Algebra va analiz elementlari. – Moskva, 2014. – 102–118-betlar.
3. Rustamov A.A. Algebra va matematik analiz. – Toshkent: Oʻqituvchi, 2020. – 95–110-betlar.
4. Kolmogorov A.N. Matematika kursi. – Moskva, 2010. – 210–225-betlar.
5. Antonov V.S. Tengsizliklar va ularni yechish usullari. – Sankt-Peterburg, 2013. – 60–78-betlar.