THE ROLE OF EXTREME PROBLEMS IN THE TEACHING OF MATHEMATICS IN HIGHER EDUCATION

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Annotatsiya: Ma'lumki, keyingi vaqtlarda ekstremal masalalarni o'rganishga qiziqish ortmoqda. Bu masalalarning fizika, mehanika, matematik biologiya va texnika fanlar masalalarini tadqiq qilishda foydalanish bilan ham, matematika nazariyasi taraqqiyoti ichki ehtiyojining natijasi sifatida ham izohlash mumkin.

Kalit so'zlar: ekstremal masala, afsonaviy Diana masalasi, kvadrat, perimetr, yuza

Annotation: It is known that interest in studying extreme issues is increasing in recent times. It can be explained both by the use of these problems in researching the problems of physics, mechanics, mathematical biology and technical sciences, and as a result of the internal need for the development of mathematical theory.

Key words: extremal problem, legendary Diana problem, square, perimeter, surface

It is natural for mathematicians to ask themselves the following question: "Which mathematical problems are the most important?"

This question can be answered as follows: Life presents various problems to mathematics, and it is very difficult to single out the most important ones. Nevertheless, it is possible to point out some groups of problems, which should be recognized as having an incomparable importance in the science of mathematics and its various applications.

In this group of problems, first of all, the problems of finding the largest and smallest values can be included.

The Russian mathematician Chebyshev expressed the following thoughts about this: - the practical activity of mankind is extremely diverse, he must solve such problems in order to be satisfied with his work, so that he can get more profit as a result, solving such problems is a separate direction is recognized as the theory of the largest and smallest values. Such problems have a purely practical nature, study all the laws of the movement of matter and directly stimulate the development of mathematics.

According to the information given in historical sources, the following issue of a legendary nature can be seen.

Diana, the queen of the land of Tire, is forced to accept the following conditions imposed by the local population in search of a new place for her people. According to this condition, Diana will be forced to occupy a place covered by the skin of an ox for her compatriots. In order to get out of this predicament, the queen cuts the entire ox

hide into thin strips and arranges them in such a way that they occupy as much space as possible.

The mathematical problem faced by Queen Diana is as follows:

Enclosing the largest possible area with a closed curve given the perimeter.

Intuitively, the optimal curve in Diana's problem is a circle. Below we will get acquainted with a slightly more sophisticated version of this issue. Suppose, from the practical side, Diana is forced to choose a rectangular area.

If we mark the sides of a rectangle with x and y, its perimeter

$$P = 2x + 2y \qquad (1)$$

will be. And the surface, $S = x \cdot y$ (2)

X and Y – quantities are considered non-negative as they represent cross-sectional lengths.

According to formula (1) X and Y

$$\frac{p}{2} \geq x \geq 0, \quad \frac{p}{2} \geq y \geq 0 \qquad (3)$$

satisfies the inequalities. And S for the surface,

$$\frac{p^2}{4} \geq xy = S \qquad (4)$$

inequality in the form is appropriate. In this case, we ask the following question: what should be the dimensions of a rectangle so that its surface is the largest?

According to the theorem about the mean arithmetic and mean geometric values between two numbers:

$$\frac{x+y}{2} \geq \sqrt{xy} \qquad (5)$$

Because of the above $x + y = \frac{p}{2}$

$$\frac{p}{4} \geq \sqrt{xy} \quad \text{or} \quad \frac{p^2}{16} \geq xy = S \qquad (6)$$

will be.

So, a rectangle with the largest surface with a given perimeter is a square.

Conclusion

The true history of extreme problems Ancient Egyptian, Greek, and Roman scientists worked hard to solve these problems. Especially the services of scientists like Pythagoras, Euclid, Archimedes in this regard are incomparable. Nevertheless, elementary mathematics apparatus was not strong enough to solve extreme problems with mathematical rigor. By the 16th and 17th centuries, the creation of differential and integral calculus by Newton, Euler, Leibniz, Bernoulli, and others allowed a serious approach to solving extreme problems. Since this period, solving various extreme

problems has taken an important place in the activities of scientists, and the methods of solving them have been improved more and more.

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