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ADVANCING QUALITY IN HIGHER MATHEMATICS CLASSES VIA MATHEMATICAL PROGRAMS

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Abstract
This article presents a comprehensive methodology for improving lesson effectiveness by leveraging mathematical programs to address practical problems, specifically focusing on the management of reserves. Through the application of differential calculus, the study delves into the optimization of storage costs, employing gradient methods to attain optimal solutions. By elucidating the intricacies of total cost calculation, this research underscores the efficacy of mathematical programs in fostering deeper understanding and proficiency in higher mathematics education. Through practical examples and theoretical frameworks, this article elucidates the potential of mathematical programs to elevate the quality of instruction in higher mathematics classes, offering valuable insights for educators and practitioners alike.
Keywords: cost, storage, gradient, image, model, reserve, control, minimization, program, MathCAD.

Introduction

It is known that reserves play an important role in production. The reserve should be neither more nor less. If there is a lot of stock, the cost of its storage will increase, if it is less than the demand, it will not be possible to produce the required amount of products. Therefore, reducing storage needs is one of the main issues for the manufacturer. Therefore, it is appropriate to teach students how to reduce storage costs. For this, the student needs to build a mathematical model of the problem, create an algorithm for solving it, and develop the ability to solve it using mathematical programs. The resulting factor can be linearly and non-linearly related to many factors. If the resulting factor relationship is non-linear, then computational mathematics methods are used. One of the simplest methods is the gradient method.

Check out the features below to the extreme

$$Z = f\left(x_1, x_2 ..., x_n\right) \to Exp, \qquad X = \left(x_1, x_2 ..., x_n\right)$$

The main algorithm of the gradient method is to determine the initial approximation of $M_o\left(x_1^o, ..., x_n^o\right)$ and find the sequence of points in the following scheme.

$$M_o \to M_1 \to M_2 \to ...$$

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$$X_j\left(M_j\right)=X_j\left(M_{j-1}\right)+\alpha\frac{\partial Z\left(M_{j-1}\right)}{\partial X_j},\quad j=\overline{1;n}$$

Here, α - plays an important role, $\alpha<0$ da, min is checked, $\alpha>0$ $da\max$ is checked. The calculation process $\left|f\left(M_j\right)-f\left(M_{j1}\right)\right|<\varepsilon$ is continued until the condition is met. We will study the following examples in the MathCAD program.

An example. The firm bought two types of raw materials x_1 and x_2 tons. $f(x_1,x_2)=x_1^2-7x_1+x_2^2+4x_2-x_1,x_2+45$ (thousand som) is spent to decorate these raw materials. If he buys the quantity of each raw material, he spends less on the cost.

$$f(x1,x2) := x1^2 - 7\cdot x1 + x2^2 + 4\cdot x2 - x1\cdot x2 + 45$$

$x1 := 1$ $x2 := 1$ $\varepsilon := 0.1$ $h := 0.5$

```
C := | x1 ← x1
     | x2 ← x2
     | ε ← ε
     | h ← h
     | for i ∈ 1..100
     |   | f1 ← d/dx1 f(x1, x2)
     |   | f2 ← d/dx2 f(x1, x2)
     |   | x1 ← x1 − h·f1
     |   | x2 ← x1 − h·f2
     |   | break if (f1 < ε)·(f2 < ε)
     | C_0 ← i
     | C_1 ← f(x1, x2)
     | C_2 ← x1
     | C_3 ← x2
     | C
```

$$C=\begin{pmatrix}100\\39.12\\4.8\\2.6\end{pmatrix}$$

Inventory management plays an important role in production, where one of the main tasks is to calculate the total cost. We will learn how to manage the stock of one type of product. Then the total cost function is calculated as follows

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$$C(q) = c \cdot d + \frac{Sd}{q} + \frac{dh}{2}$$

where c is the price of the product, d is the intensity, S is the external cost, and q is the product size of one batch.

We calculate the $C(q)$ -function using extremum testing.

An example. The demand interval for the product is 500 c.s. per year, organizational costs are $S = 4$ c.s., storage costs are 4 c.s., and the price of goods is 4.

$$TOL := 10^{-4}$$

$$C(q) := 1000 + \frac{2000}{q} + 2 \cdot q$$

$$C1(q) := \frac{d}{dq} C(q)$$

$$C1(q) \rightarrow 2 - \frac{2000}{q^2}$$

$$C1(q) = 0 \text{ solve } \rightarrow \begin{pmatrix} 10 \cdot \sqrt{10} \\ -10 \cdot \sqrt{10} \end{pmatrix}$$

So, $q := 10 \cdot \sqrt{2}$

critical point

$$C2(q) := \frac{d}{dq} C1(q) \qquad C2(10 \cdot \sqrt{2}) = 1.414$$

$$C(q) = 1.17 \times 10^{3}$$

If we buy a $x_1 = 4,8t$, $x_2 = 2,6t$, we will spend 39.12 thousand soms for storage.

Conclusions

The student learns the following by solving problems of this type. Creates the ability to build the simplest mathematical model of stock management in the organization of production, and develops the ability to make the right decision by finding and analyzing the solution of the mathematical model based on the MathCAD program.

References

1. Abdurazakov A., Mirzamahmudova N., Maxmudova N. “Iqtisod” yo‘nalishi mutaxassislarini tayyorlashda matematika fanini o’qitish uslubiyoti //Scientific progress. – 2021. – Т. 2. – №. 7. – С. 728-736.

2. Abdujabbor A., Nasiba M., Nilufar M. The Numerical Solution of Gas Filtration in Hydrodynamic Interconnected Two-Layer Reservoirs //Eurasian Journal of Physics, Chemistry and Mathematics. – 2022. – Т. 6. – С. 18-21.

3. Abdurazakov A., Mirzamahmudova N., Maxmudova N. Iqtisodiy masalalarni maple dastur tizimi yordamida yechish uslubiyoti //Scientific progress. – 2021. – Т. 2. – №. 7. – С. 737-745.