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APPLICATION OF DIFFERENTIAL EQUATIONS IN MEDICINE

Saydakhmedova M. D.
Magisters Student
Fergana State University
Fergana, Uzbekistan

Today, thanks to globalization, technologies are improving every year, new knowledge and research in the field of medicine are emerging. To create a technique, scientists need calculations where they can't do anything without differential equations. Activities in the world are changing, medical personnel are connected with mathematical modeling, statistics used in practice and other phenomena.

The processes taking place in the world now require deep and high-quality knowledge from specialists. Today, thanks to globalization, technologies are improving every year, new knowledge and research in the field of medicine are emerging. To create a technique, scientists need calculations where they can't do anything without differential equations. The types of activities in the world are changing, medical workers are associated with mathematical modeling, statistics applied in practice, etc. Specialists of economic education intend to apply their knowledge and skills in various fields. Let's consider the application of mathematical knowledge in medicine in the formation of professional competencies. The role of mathematics in medicine is to help in the implementation of diagnostic procedures. Currently, the methods of treatment and diagnosis of diseases have been significantly expanded. In some areas of medical centers, mathematical modeling methods are used, which increases the accuracy of diagnosis. Knowledge of the basics of mathematics is used by doctors to study the features of processes occurring in the human body. Many students of educational institutions study mathematics along with basic medical subjects. The main problem in applied mathematics is the choice of a mathematical model, which is not noticed in any field of knowledge, both in biology and medicine. The subject "Differential equations" is one of the largest sections of modern mathematics. It intersects with many fields of activity.

Initially, a differential equation is a derivative equation containing an unknown, or a function under a differential symbol. The basis for them is the creation of scientific papers that are used in production and are important for the modern economy and other spheres. Differential equations are also widely used in practice. For example, the result of chemical reactions, the calculation of the majority of the company's income, the dynamics of current capacity over time, the demographic situation in a certain region is calculated using differential equations.

The topic of this work will always be relevant, because mathematical methods are used to solve many problems, including in the field of medicine. Every year scientists discover new diseases, find new medicines, new methods of treatment, and all this cannot be solved without mathematics.

Let's look at the problems of applying differential equations to solve what is used in a particular medicine. Dissolution of medicinal substances in the form of tablets.

The "Solution" experiment is designed to determine the amount of active substance that passes from a precisely dosed solid form into a solution over a certain time under the conditions specified in the instructions or according to regulatory documents. Here let t be the time of dissolution, and n is the amount of substance in the tablet. In this

$$\frac{dn}{dt} = -kn$$

where y is the constant rate of dissolution. A minus in this equation means that the amount of substance in the form of a drug decreases over time. Let's see the solution. We divide and integrate the variables in the differential equation:

$$\frac{dn}{dt} = -kn$$

$$\int \frac{dn}{n} = -\int kdt$$

From here we get:

$$ln|n| = -kt + ln|C|.$$

Using the logarithm property, we get:

$$|n| = C_1 e^{-kt},$$

where $C_1 = e^c$ is an arbitrary constant number. By the property of the module, we generate the following:

$$n = C_2 e^{kt},$$

where $C_2 = \pm C_1$ is an arbitrary constant.

Given that t=0, n= n_0, we get the following $C_2 = n_0$, that is:

$$n = n_0 e^{-ct}$$

we find the propagation constant k from the equation:

$$K = \frac{1}{tln(\frac{n_0}{n})}.$$

The half-life of tablets t = $t_{\frac{1}{2}}$, n= $\frac{n_0}{n}$:

$$\frac{n_0}{2} = n_0 e^{-kt_{\frac{1}{2}}}$$

$$\frac{1}{2} = e^{-kt_{\frac{1}{2}}}$$

If we log both parts of the equation:

$$ln\frac{1}{2} = -kt_{\frac{1}{2}}$$

$t_{\frac{1}{2}}$ expressing, $t_{\frac{1}{2}} = \frac{ln2}{k} = \frac{0,693}{k}$ we get.

In our examples, these laws are expressed in the form of differential equations. Mathematical models make it easier to predict the results of experiments conducted in real systems, to study the phenomenon as a whole, to predict its development and change over time. Using the example of using differential equations to solve problems in medicine, we examined the modeling of the treatment of diseases.

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