

access to Internet services. As the result the creation of versions of corporate sites for posting on social networks becomes reasonable. Up to 85% of pharmacy networks in Ukraine and Kazakhstan have mobile applications with the most user-friendly interface. Mobile applications allow you to select a city in Ukraine or Kazakhstan and enter the name of the required medicine. The selected pharmacy can be viewed on the city map or made a call to the pharmacy without leaving the application.

Conclusions. As a result of data collection and analysis, the main directions of new approaches to the work of pharmaceutical companies with clients were identified. These new approaches make it possible to ensure a prompt search for the required drugs anywhere in the country where access to the mobile Internet is provided. An analysis of the sites of pharmaceutical firms in Ukraine and Kazakhstan showed that firms follow modern approaches to creating sites and promptly use innovations on the sites of their firms. The sites are up to date. That is, pharmaceutical companies have the opportunity to invest in the development of modern technologies for promoting their products in the markets of Ukraine and Kazakhstan.

APPROXIMATE METHOD OF SOLUTION SYSTEMS OF VOLTERRA-LOTKA EQUATIONS

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Introduction. The problem of development of antagonistic populations on the example of the Volterra-Lotka problem is considered. From the point of view of mathematics, this problem is described by the system of differential equations that can be solved only by numerical methods, which complicates the analysis and the possibility of prediction.

The aim of the study is to prove the possibility of an approximate analytical solution of the system of differential equations of the Volterra-Lotka problem. Formulas are obtained that describe the development of the predator-prey system and predict their development.

Materials and methods. Two problems are solved.

1) In the first, the Volterra problem, the system of differential equations describes changes in the numbers of lynx and hare populations over a period of time. The method of linearization is used for the solution. It consists in the fact that changes in the number of populations are small relative to some average value. This allowed to obtain differential equations that can be solved in the form of formulas. The formulas make it possible to predict the period of oscillating development of the population system and the number of populations at a given time. It turned out that the formulas can be applied in the case of large changes in population size without significant errors.

2) The method was used to analyze a more complex system when taking into account mortality in both populations. The numbers of both populations stabilize after some time and remain unchanged. This is the Volterra-Lotka task. The obtained formulas are more complex, but allow to calculate the parameters of population development and give a forecast for the future.

Results and discussion. The applied method of linearization made it possible to obtain formulas that describe and predict the development of populations over time.

Conclusion. This greatly facilitates the analysis and forecast of population development.