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Some Problems of Continuity Embedding Job Mathematical Analysis

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Abstract: - the article discusses continuity of the content of higher mathematics in the conditions of the credit training. A method for optimizing the content of mathematical analysis. The necessity of considering functions defined parametrically by considering an example, the ways of formation and development of teaching and research activities of students.

Key Words— ***Credit system, education, mathematical analysis, differential calculus.***

I. INTRODUCTION AND THEORETICAL ANALYSIS

From 2002 to the international recognition of national educational programs, enhancing academic mobility of students and teachers, as well as to improve the quality of education and ensure the continuity of all levels and stages of undergraduate and postgraduate education in universities of the Republic of Kazakhstan introduced a credit education technology [1].

Credit Learning System - a way of organizing the learning process in which students within certain limits have to be individually planned sequence of educational trajectory work week.

When this is accompanied by one academic hour 2 hours of independent work of students (working with textbooks, homework, conduct research and work with the teacher).

According to the requirements of the credit technology is offered each academic discipline to study as a set of interconnected and flowing out of each other problems that the student needs to learn under the guidance of a teacher for the most part independently. Role of the teacher in this case is reduced to the formulation of the problem, and the justification of its relevance and practical significance to the overall management of cognitive and creative activity of students. And the most important in the work of the teacher is to determine the content of their academic discipline. Here we are under the content of the discipline understand the system of scientific knowledge and related practical skills that students need to master.

The essence of credit system of education is that the account of the complexity of the educational work carried out in the credits, which characterize the volume of the material taught.

Credit (Credit-hour) - Universal unit volume of academic work and student teacher. When organizing the educational process of the loan program should be borne in mind that the credit is equal to 1 to 3 hours the study of mathematical analysis begins at school and is the main content line in the course of higher mathematics for non-core specialties. And in determining the content of mathematical analysis under the loan program is necessary to conduct a content that is provided as the acquisition of knowledge and the learning of specific competencies in their activities, i.e. integral link between cognition and activities [2].

The standard curricula, developed on the basis of the educational standard, reflected in higher mathematics discipline and the main content of the list of available educational literature. For example, in a typical plan for higher mathematics for chemical specialties in the "Research and graphing functions using differential calculus" content is limited to only the functions defined in the Cartesian coordinate system. While in the "Calculation of areas of plane figures, arc lengths, volumes of solids" consider the function given in parametric form, polar coordinate system [3]. Also in traditional textbooks in higher mathematics is not considered research and charting functions specified in parametric form using differential calculus [4, 5]. At the same time in many natural and engineering researches, particularly in the physical and chemical processes are often considered the functions specified in parametric form. It is important to form an initial concept, actions with them, instill a culture of student construction of these functions represent the dynamics teach these dependencies. And all this is best perceived and implemented in a natural environment, i.e. in the study of mathematical analysis. In this case, not only carried Interdisciplinary integration, but also restored the continuity of the inner content of higher mathematics.

Current stage of development is characterized by specialization of education and training up to twelve education. Under these conditions, the displacement of some

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of the content in the earlier period is considered natural . For example , students graduating classes of specialized schools and colleges study and charting functions of one variable by using differential calculus studied sufficiently before joining the university. In the implementation of continuity, in our opinion, should stick following judgments : in school mathematics content include (if necessary) that the university will not require re-examination and relying on him to consider the following levels .

Now, for various reasons, some content of high school mathematics content schooling repeated in the same volume. To prevent adverse effects in the matter under consideration offer the university to focus on parametric representation of functions.

Function $y = f(x)$ given explicitly constructed and well researched. At the same time, the correspondence between variables makes it impossible to describe certain curves in arbitrary locations on the plane. Also, the curve can not be closed. In such cases it is convenient to describe the dependence of the parametric function, which has a more diverse forms than it allows explicit functions.

If $x(t)$ and $y(t)$ defined for some t and there is an inverse function $t = \theta(x)$ for $x(t)$, we speak of a parametric specification functions $y(\theta(t))$ function.

The parametric form is created in the form of.

$$\begin{cases} x = x(t) \\ y = y(t) \end{cases}$$

And when passing threads derivative functions necessarily teach students to find the derivative of parameterized:

$$y'_x = \frac{y'_t}{x'_t} \qquad (1)$$

Writing y'_x also in the parametric form:

$$\begin{cases} x = \varphi(t) \\ y'_x = \dfrac{y'_t}{x'_t} = \psi(t) \end{cases}$$

And applying the formula (1) is the second derivative (provided that there are second order derivatives):

$$y''_{xx} = (y'_x)' = \frac{\left(\dfrac{y'_t}{x'_t}\right)'_t}{x'_t} = \frac{x'_t y''_{tt} - x''_{tt} y'_t}{(x'_t)^3} \qquad (2)$$

And in the study and construction of graphs of functions of one variable by using differential calculus to consider functions in parametric form. Study of the function in parametric form using differential calculus have their own characteristics and requires some effort [6, 7]. Following the statement by Gel'fand, "Theories come and go, but examples remain," proceed to consider the following example.

Example Graph a function given in parametric

Solution Note that $x(\pi + t) = x(t)$ and $x(\pi + t) = x(t)$ hence $t \in [0; \pi]$.

We compute the derivatives y'_x formula (1):

$$y'_x = \frac{y'_t}{x'_t} = \frac{3\sin 3t}{2\sin 2t}$$

Solving the equation $y'_x = 0$, find the critical points: $\frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}$, And these points divide the segment $[0; \pi]$ intervals whose boundaries are these points (Table 1). Determine the sign of the derivative y'_x and intervals of increasing and decreasing functions $y(x)$.By formula (2) calculate the second derivative y''_{xx} and simplify:

$$y''_{xx} = \frac{3}{2}\frac{3\cos 3t \cdot \sin 2t - 2\cos 2t \cdot \sin 3t}{\sin^2 2t} \cdot \frac{1}{-2a\sin 2t} =$$

$$= -\frac{3}{4}\frac{\cos 3t \cdot \sin 2t + 2\cos 3t \cdot \sin 2t - 2\cos 2t \cdot \sin 3t}{a\sin^3 2t} =$$

$$= -\frac{3}{4}\frac{\cos 3t \cdot \sin 2t - 2\sin t}{a\sin^3 2t} = \frac{-3\sin t(\cos 3t \cdot \cos t - 1)}{2a\sin^3 2t}$$

Define the function of the inflection point and the direction of the convexity of each of the intervals bounded by inflection points or points at which the second derivative does not exist. All results will be written in table 1 (at $a = 1$).

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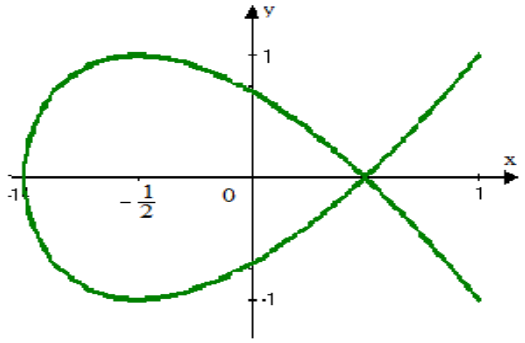
Table 1. Function test results $\begin{cases} x = a\cos 2t \\ y = a\cos 3t \end{cases}, \quad (a > 0)$

t	$\left(0; \frac{\pi}{3}\right)$	$\left(\frac{\pi}{3}; \frac{\pi}{2}\right)$	$\left(\frac{\pi}{2}; \frac{2\pi}{3}\right)$	$\left(\frac{2\pi}{3}; \pi\right)$
$x(t)$	$\left(1; -\frac{1}{2}\right)$	$\left(-\frac{1}{2}; -1\right)$	$\left(-1; -\frac{1}{2}\right)$	$\left(-\frac{1}{2}; 1\right)$
$y(t)$	$(1; -1)$	$(-1; 0)$	$(0; 1)$	$(1; -1)$
y'_x	$y' > 0$, i.e. function increases	$y' < 0$, i.e. function decreases	$y' > 0$, i.e. function increases	$y' < 0$, i.e. function decreases
y''_{xx}	$y'' > 0$, i.e. concave function	$y'' > 0$, i.e. concave function	$y'' < 0$, i.e. function is convex	$y'' < 0$, i.e. function is convex

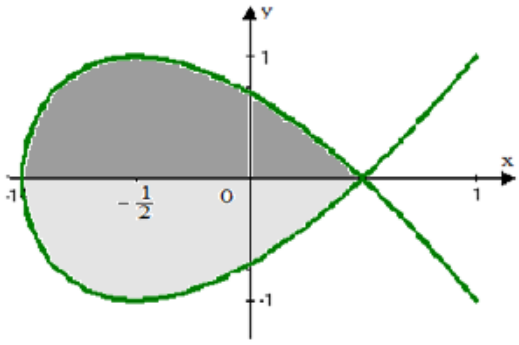
According to these data, we construct a graph of the function (if$a = 1$)



Under a credit system must improve pedagogical skills, training organizers of the training process, sharing of best practices. When this system is necessary to ensure the educational process methodology and practice development and optimal use of instructional modern time information technologies Yes, we do not exclude the possibility of using good software, but there is still important to the research process, the formation and development of teaching and research activities of students, in particular, feel Skill function.

Knowledge obtained from this section will help students to be more competent in computing areas of plane figures, arc lengths, and volumes of solids. For example, you need to calculate the area of the figure bounded by the curve.

Solution use the formula $A = \int_{\alpha}^{\beta} y(t)x'(t)dt$



This figure is symmetric with respect to the axis Ox, so it suffices to compute the area of the figure in the upper part of the axis Ox. To find the measure of integration, we note that in these degrees $y = 0$ hence $\alpha = \frac{\pi}{2}$ and $\beta = \frac{\pi}{6}$

$$A = 2\int_{\frac{\pi}{2}}^{\frac{\pi}{6}} a\cos 3t \cdot (-2a\sin 2t)dt = 4a^2 \int_{\frac{\pi}{6}}^{\frac{\pi}{2}} (\sin 5t - \sin t)dt = 4a^2\left(-\frac{1}{5}\cos 5t + \cos t\right)\Big|_{\frac{\pi}{6}}^{\frac{\pi}{2}} = \frac{6\sqrt{3}}{5}a^2$$

II. CONCLUSION

Application techniques for teaching and research work of students depend on the level of methodical preparation of the teacher who has to organize students to solve educational problems, perform educational and research jobs. Recycling Center content of academic disciplines in higher mathematics reflected methodical system associated with goal setting and planning activities of the student. In particular , systematic feature mastering calculus , used in the study and construction of graphs of functions defined parametrically , is that students : 1) Be aware that the property of the object represented as a mathematical expression is valid if it is proved by mathematical methods , 2) learn new relationships and connections with specific methods of solving problems , and 3) learn about the application of mathematics to other sciences and learn approach to the application of mathematical methods.

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