NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN No: 2581 - 4230
VOLUME 8, ISSUE 12, Dec. -2022

ABOUT THE TEACHING OF SPECIFIC INTEGRAL SUBJECTS IN GENERAL SECONDARY EDUCATION SCHOOLS AND SECONDARY SPECIAL VOCATIONAL EDUCATION INSTITUTIONS

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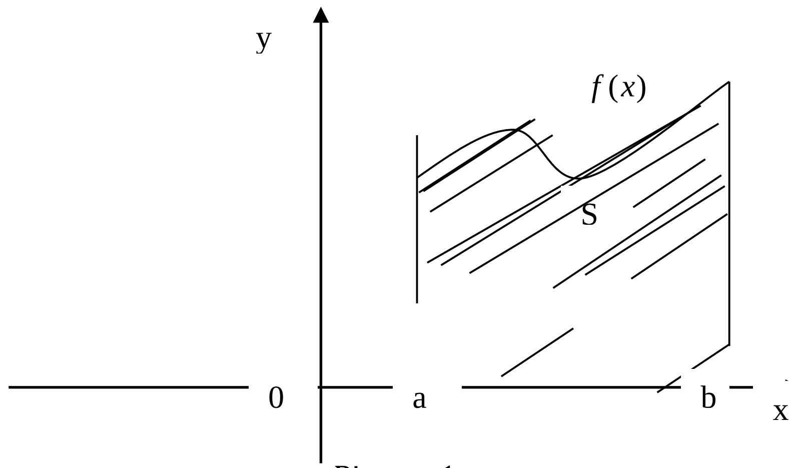
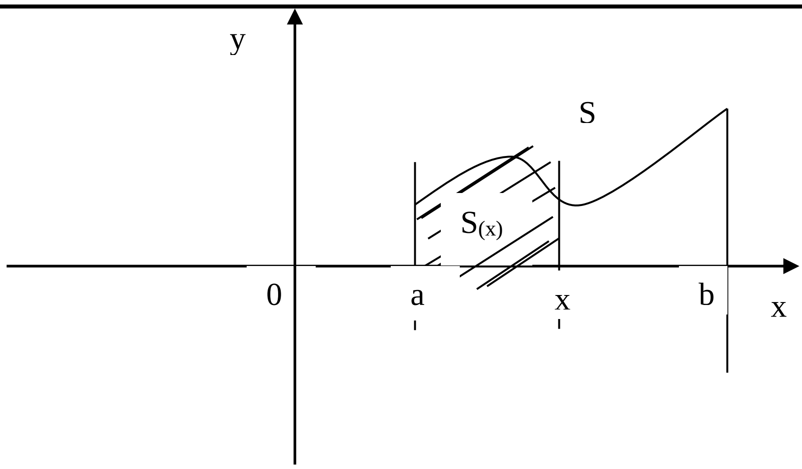
As we know, in actual textbooks, the concept of definite integral is given in the following way - content:

- the problem of finding the surface of a curved treapetion is given, that is, $f(x)$ finding the surface of the area bounded by the graph of the function from above, $[a;b]$ by the section from below, and from the side by straight lines - the surface of the curved toapetion. $x=a,\ x>b$
- This S is defined as the surface. (Figure 1).



Picture 1

- $[a;x]$ The base curve $S(x)$ is determined by the surface of the trapezoid (Fig. 2). In this case $x=a$, $x=b$ there will be , $S(a)=0$ and $S(b)=S$.
- $S(x)$ is shown to $S(x+h)-S(x)$ be the initial function of the function, $S'(x)=f(x)$ i.e. $f(x)$ the difference is seen, where $h>0$ (or $h>0$). This difference $[x;x+h]$ is equal to the face of the curved trapezoid with the base. (Fig. 3).



Picture 2

- It can be seen from the figure that if h the number is small, then this surface is approximately $f(x)\cdot h$ equal to , i.e. $S(x+h)-S(x)\approx f(x)\cdot h$. So, $\frac{S(x+h)-S(x)}{h}\approx f(x)$.

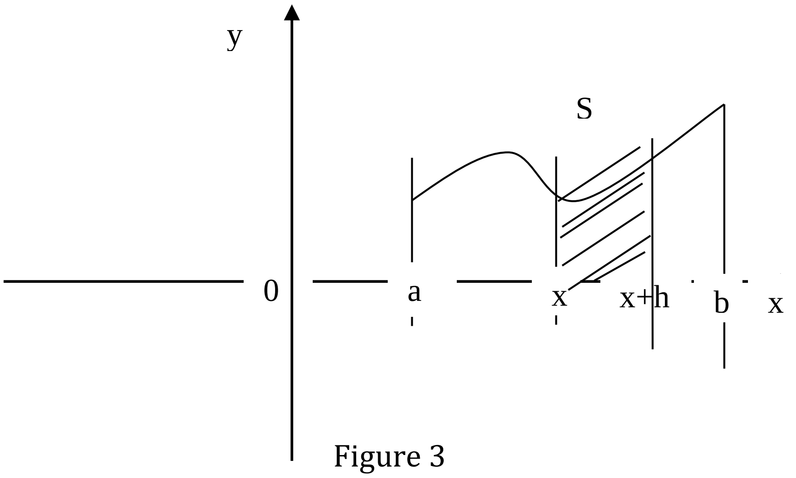


Figure 3

- the left side of this approximate equality $h\to 0$, $S`(x)=f(x)$ the equality is formed. So $S(x)$ the function $f(x)$ is the starting function for the function.
- It is known that the initial function $f(x)$ of a function $f(x)$ differs from another initial function of this function by a constant number, i.e. $F(x)$

$F(x)=S(x)+c$ (s-constant number) (1)

From $C=F(a)$ this equality we get the equality $x=a$ from $S(a)=0$ and $F(a)=S(a)+c$. Then it follows from (1) $S(x)=F(x)-F(a)$. Here it is formed $x=b$ from $S(b)=F(b)-F(a)$, that is $S=F(b)-F(a)$.

- The conclusion is as follows:

Surface of a curved trapezoid

$$S=F(b)-F(a)$$

can be calculated by the formula, where $F(x)$ any initialization of the given function is given: $f(x)$

- It is defined as:

$F(b)-F(a)$ differential $f(x)$ function $[a;b]$ in the section and $\int_a^b f(x)dx$ is defined in the form, it is taught to read.

- $\int_a^b f(x)dx = F(b) - F(a) = F(x)\Big|_b^a$ the formula is called the Newton-Leibnitz formula.
- Here is a brief historical background to the following:

The problem of calculating the surface of a shape bounded by curves led to the concept of definite integral. The continuous $f(x)$ function is divided into cross-sections using defined $[a;b]$ cross- section $a = x_0, x_1, x_2, ..., x_{n-1}, x_n = b$ points , and $[x_k; x_{k+1}](k = 0,1,...,n-1)$ an arbitrary ξ_k point is taken from each cross-section (Fig. 4).$[x_k, x_{k+1}]$

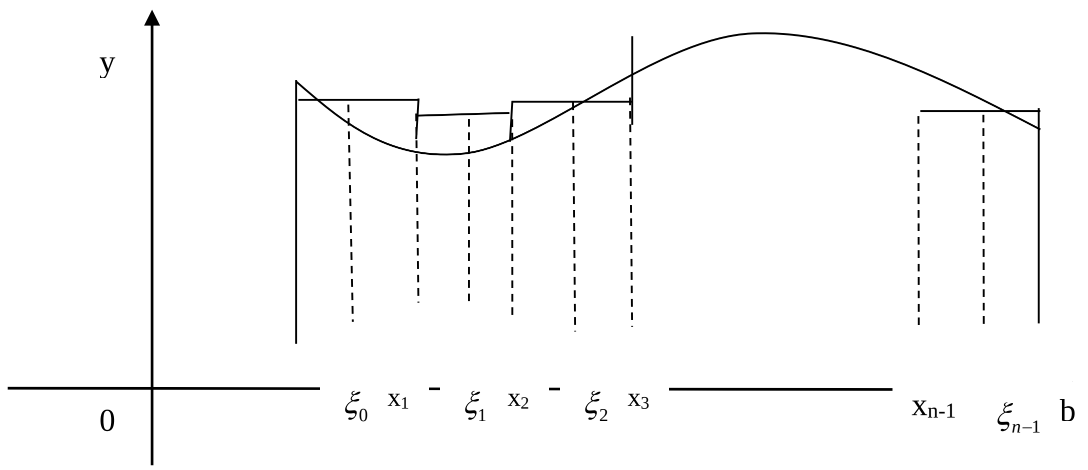


Figure 4

- $[x_k; x_{k+1}]$Determining $f(x)$ the length of the section by multiplying it by the value $\Delta x_k = x_{k+1} - x_k$ of the function ξ_k at the point $f(\xi_k)$, this

$$S_n = f(\xi_0)\cdot\Delta x_0 + f(\xi_1)\cdot\Delta x_1 + ... + f(\xi_{n-1})\cdot\Delta x_{n-1} \qquad (2)$$

the sum is formed, where each addendum Δx_k is a face of a rectangle with base S_n and height . is approximately equal to $f(\xi_k)$ the face of a trapezoid with a sum curve S: $S_n \approx S$ (Fig. 4).

- (2) the sum is called the integral sum $f(x)$ of the function $[a;b]$ on the section.
- The exact integral is defined as:

If n ($n \to \infty$), Δx_k tends to zero when tending to infinity $(\Delta x_k \to 0)$, then S_n the integral sum tends to some number. This number $f(x)$ is called the definite integral of the function in the section.$[a;b]$

- Examples of finding surfaces and calculating exact integrals are given.

In general, the following conclusions can be drawn about the specific topic of integration in current textbooks:

1. the concept of definite integral $F(b) - F(a)$ through the differentiation of initial functions, enriched with pictures, leads students to understand the concept of definite integral in a convenient, simple language - content, by calculating surfaces.
2. A brief historical introduction to the concept of definite integral through the limit of the sum of integrals.
3. There is absolutely no information about the existence or non-existence of the definite integral.

4. Many examples of the calculation of the definite integral are solved, and many examples of different content are given for independent work and control work. Self- test answers are also provided. This is certainly very good, but the methods of calculation are not given in detail.

In general, in the 11th grade of secondary education schools and secondary special, vocational educational institutions, when giving the subject of definite integral (also the subject of the function limit, which is used in the concept of definite integral), taking into account the above information, conclusions, and explaining the subject from the point of view of pedagogy: to whom, what, We would like to ask you to pay attention to the following suggestions and considerations while covering the topics with a more positive approach to the issue of giving in what content, in what volume and in what way.

Taking into account that the concept of definite integral is introduced through the limit of the integral sum, first of all, when introducing the concept of limit, it is necessary to pay attention to the following:

1. When presenting problems leading to the concept of limit in tabular form, x the value of the function when approaching a value from the left and right $f(x)$

-to some unique finite number
-to infinite value (∞)
- separately, to a separate number
giving examples of approximation.

2. Giving the concepts of approach from left and right with the help of given examples.
3. Defining the limits as follows:

-If x the value of n $a(x \neq a)$ approaches a number both from the left and from the right, $f(x)$ the corresponding values of n A approach a single finite number, then $\grave{A}$ the number x n a approaches $f(x)$ the limit of the function and $\lim_{x\to a} f(x) = A$ is written in the form

-If x the value of , $a(x \neq a)$ both when approaching a number from the left and when approaching from the right, approaches $f(x)$ the corresponding values of ∞, then ∞ is called the limit of the function as $\lim_{x\to a} f(x) = \infty$ the number x approaches $f(x)$ ni and a is written in the form

- If x the value of n $a(x \neq a)$ does not approach a single number either when approaching the number from the left or when approaching it from the right, then the limit of the function as it approaches the number x n a is said not to exist.

4. Examples of finite, infinite or non-existent functions with a limit are given and analyzed in pictures first through graphs of the function (as in textbooks).
5. On the basis of these proposals, concepts are given about the continuity of the graph of the function and the break point.

We believe that it is necessary to pay attention to the following when giving the topics of elementary functions and definite integrals.

6. When the concept of initial function is introduced, what kind $f(x)$ of initial function is there? and answer.
7. The definite integral should be defined as follows:

If it n tends to zero $(\Delta x_k \to 0)$ when tending to infinity $(n \to \infty)$, Δx_k , then S_n the limit of the sum of integrals A tends to a number (finite or infinite), and this A number $f(x)$ is called the definite integral of the function in the section. $[a;b]$ If the limit does not exist, then the definite integral $f(x)$ of the function $[a;b]$ in the section is said to not exist.

8. Examples of calculation of several surfaces and calculation of definite integral are given.
9. In particular, in the problems of finding surfaces, it is necessary to pay attention to the problems that lead to the calculation of differences or sums of definite integrals.
10. $\int_a^b f(x)dx$ the necessary condition for the existence of the definite integral must be given without proof.
11. $\int_a^b f(x)dx$ a sufficient condition for the existence of a definite integral must be given without proof.
12. It is necessary to further increase the properties of the definite integral.
13. Bringing the "change of variables" and "integration by pieces" methods of calculating the exact integral. It is necessary to enrich with examples.

In our opinion, taking these suggestions and comments into account will lead to an expansion in scope and content of the function limit and specific integral topics. However, if the theoretical, practical and applied importance of the topics is taken into account, we believe that the student will play a more important role in the wider and deeper mastering of the topic, creative thinking.

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