Creation Of Connection With Mathematics Subject Of The Subject Of Information Science

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Abstract

Program of the mathematics subject and should be analyzed system with mathematics subject with purpose of creation of the connection in the teaching of the subject of information science and more expedient subject themes must be elected for connection.

Keywords: interdisciplinary relationship, teaching methodology, definite integral, individual functions, approximate calculation.

Introduction

One of the important issues in the teaching of computer science is to students with fundamental knowledge and practical skills that reveal the essence of computer science in order to gain a deeper understanding of the basics of other sciences. From this point of view, the teaching of informatics subject related to other subjects is one of the actual issues and has wider possibilities [1].

In order to establish a systematic relationship with mathematics in the study of computer science, the programs of mathematics should be analyzed and more suitable topics should be selected for the connection. Since it is not possible to study all the relationships created within one subject, the topic "Individual functions" from the computer science program, and "Definite integral" from the mathematics program. Calculation of integrals. topic is selected. Both topics have the opportunity to explain the relationship in detail.

We believe that the students were given non-standard theoretical information about the mechanism of individual functions in the previous lessons, and the application of individual functions was demonstrated practically with simple examples. The main goal in creating the link is to explain the subject of individual functions more broadly and to provide students with the necessary knowledge for the approximate calculation of integrals on computers using individual functions, to develop practical skills, and to further deepen the knowledge gained from the subject of mathematics.

$$S = \int_a^b f(x)dx \approx \frac{b-a}{n}\left[\frac{1}{2} f(x_0) + f(x_1) + f(x_2) + \ldots + f(x_{n-1}) + \frac{1}{2} f(x_n)\right];$$

In order to simplify the calculation

$$h = \frac{b-a}{n}, \qquad x_i = a + ih, \qquad f_i = f(x_i)$$

take into account that

$$t = \frac{1}{2}\left(f_0 + f_n\right) = \frac{1}{2}\left(f(a) + f(b)\right), \qquad r = f_1 + \ldots + f_{n-1}$$

if we accept then

$$S = \int_a^b f(x)dx \approx h(r+t);$$

get the expression. It is known that n -[a,b] is the number of parts of the same length as the fragment (Figure 1.).

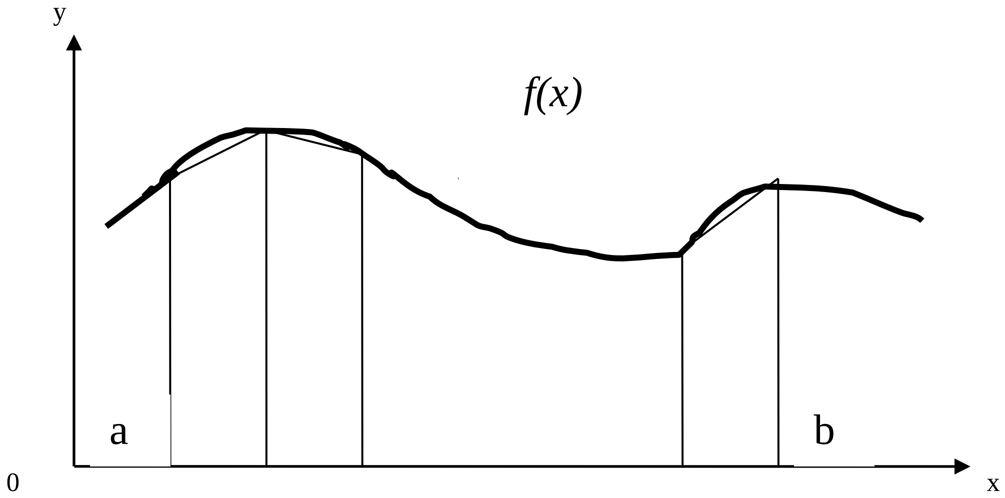

Figure 1.

It is necessary to first calculate a simple integral integral whose value can be calculated accurately using the Newton-Leibnis formula.

Example. $\int_o^9 x^2 dx;$ calculate the integral using the trapezoidal method. Based on the theoretical information and practical skills known to students about the individual function mechanism, as well as using the above calculation methods, we compile the following program to solve the given problem on the computer [2]:

```
// Option 1
#include <iostream>
#include <iomanip>
using namespace std;
// inteqralin qiymetini teqribi hesablayan funksiya
float Inteqral(float a,float b,int n)
{float h,fi,xi,r,t;
int i;
r=0;h=(b-a)/n;
for(i=1;i<=n-1;i++)
{xi=a+i*h;
fi=xi*xi;
r=r+fi;
}t=0.5*(f(a)+f(b));
return h*(r+t);
}
// esas funksiya
int main()
{int n; float s;
```

```
cin>>n;
s=Inteqral(0,9,n);
cout<<fixed<<setprecision(10)<<"Inteqralin qiymeti ="<<s<<"  "<<"n="<<n;
return 0;
}
```

Let's show the results of the calculation for different values of n:

The value of the integral =243.0121765137 n=100
The value of the integral =243.0004272461 n=500
The value of the integral =243.0000457764 n=1000
The value of the integral =243.0000000000 n=20000

Thus, it is shown that the calculation accuracy increases as the number of equal parts (n) in the fragment [a,b] increases.

It is clear that when this integral is calculated by the Newton-Leibnis formula, its exact value is 243. This shows that the value of the integral is calculated using the trapezoid method.

Using this program, it is possible to achieve a better understanding of the geometric meaning of the integral. For example, if we execute the program by taking [0,3], [0,6], [5,8] successively in the region of [0,9], we will see that the calculated area is less than the previous area. It is clear that the reference to the individual function in the main program block should be changed accordingly.

```
S=İnteqral(0,3,n);  S=İnteqral(0,6,n); S=İnteqral(5,8,n);
```

It is useful to offer students the exact calculation of these integrals with the Newton-Leibnis formula and to compare the obtained results with the experimental results obtained from the execution of the programs. We gradually expand the possibility of using the individual function after we are sure that the explained material is properly adapted. For this purpose, we define the integrality of the function f(x)=x2 as an individual function. This feature is demonstrated in the next version of the program.

```
// Option 2
#include <iostream>
#include <iomanip>
using namespace std;
// Integral function
float f(float x)
{return x*x;
}
// function that approximates the value of the integral
float Inteqral(float a,float b,int n)
{float h,fi,xi,r,t;
int i;
r=0;h=(b-a)/n;
for(i=1;i<=n-1;i++)
{xi=a+i*h;
fi=f(xi);
r=r+fi;
}t=0.5*(f(a)+f(b));
return h*(r+t);
}
// main function
int main()
{int n; float s;
cin>>n;
s=Inteqral(0,9,n);
cout<<fixed<<setprecision(10)<<"Inteqralin qiymeti="<<s<<"  "<<"n="<<n;
return 0;
```

}
By executing this version of the program on the computer, we show that the same result as the first version (version 1) is obtained.
Like Eyurtsndts, this option is more universal. Thus, connecting the integral function with another function, we get the opportunity to calculate any integral function that interests us through this program.

For example, $\int_0^4 \frac{1}{1+\sqrt{x}}dx;$ in the program we compiled for calculating the integral

```
Function
float f(float x)
{ return 1/(1+sqrt(x));
}
```

It is associated with and #include <cmath> is included in the program header. The expression in the basic function is s=Integral(0,4,n); is associated with the operator and very easily we achieve the approximate calculation of the given new integral.

The mechanism of approximate calculation of integrals with certain ε accuracy can also be shown. The custom function mechanism allows you to perform such calculations very easily. Thus, if we denote the calculated values of the integral for n and 2n points as Sn and S2n, respectively, |S2n - Sn| If the ≤ ε condition is fulfilled, S2n is taken as the value of the integral calculated with ε accuracy. If the condition is not fulfilled, the number of parts of the fabric will be increased by 2 times, the value of Sn will be compared with the value of S2n, S2n will be reset, the set condition will be checked, etc.

We can come to the conclusion that with the presented methodology, the "Individual functions" subject of computer science from the mathematical science "Probability integral. Calculation of integrals. while creating a connection with the topic, both the chosen topic is completely revealed, and students get the necessary information for the practical calculation of integrals on the computer, and practical habits are adopted.

Thus, one of the ways of creating a connection between informatics and mathematical science, which are organically related to each other, was theoretically and practically demonstrated.

LITERATURE

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