METHOD OF USING THE PROGRAMMING LANGUAGE CALCULATION OF INTEGRAL FUNCTIONS

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ABSTRACT

This article discusses the method of using C++ programming in calculating the integral function. It is also shown that science integration is important in the preparation of future programmers for professional activities.

Keywords: Didactics, integration, random quantity, distribution function, integral function, software tools, program code.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

Ensuring the organic and continuity of education in the educational process on the basis of new educational technologies and teaching methods which are based on the use of modern information technologies is actual issue in all stages of the implementation of the National program for training. The organic and continuity of education are very important concepts in the educational process and are considered one of the main didactic principles.

It is important to properly select and use educational forms, methods and tools of education which are scientifically and comprehensively based in sufficient level in order to increase further improve the efficiency of the educational process. One of the most important such tools is to organize the educational process with achieving interdisciplinary connections [6], [7].

The issues in practical content play an important role in achieving interdisciplinary connections in the process of teaching mathematics, first of all, they help students to understand mathematics as a science. Secondly, solving the practical problems leads that the students learn mathematical knowledge through using skills and understanding knowledge by subject in the process of directly learning another subjects [10].

According to abovementioned views, we give the use of software tools, mainly the programming language, in the study of the distribution function of a random quantity and create its graph.

The acceptable values of the random quantity X and the probabilities of accepting those values are called the distribution law of the random quantity X. In order to write the distribution law, the values which the random quantity can accept, must be finite or cardinal. Such random variables are called discrete random variables [1].

   The distribution law of the discrete random quantity is as follows in general:

1^0 $p_k \geq 0,\ k = 1,2,\ldots,n$;

2^0 $p_1 + \ldots + p_n = 1$.

Binomial distribution law $P_n(k) = \dfrac{n!}{k!(n-k)!} p^k (1-p)^{n-k}$, $k = 0,1,2,\ldots,n$.

Puasson distribution law $P_k = \dfrac{\lambda^k}{k!} e^{-\lambda}$, $\lambda - \textit{мусбат}$.

Mathematical expectation of the discrete random quantity. Let the distribution law of the random quantity X is given. $x_1 p_1 + x_2 p_2 + ... + x_n p_n$ is called the mathematical expectation of the random quantity X, and it is indicated as $M(X)$. The dispersion of the random quantity X is called the mathematical expectation of the random quantity $(X - M(X))^2$ and it is indicated as $D(X)$ [5].

1^0. The dispersion of a constant number is equal to zero: $D(C) = 0$;

2^0. $D(CX) = C^2 D(X)$;

3^0. $X \perp Y \Rightarrow D(X + Y) = D(X) + D(Y)$;

4^0. $X \perp Y \Rightarrow D(X - Y) = D(X) + D(Y)$.

If the accepted values of the random quantity X fill some interval in the axis of numbers, such random quantities will be called continuous random quantities.

The distribution law for continuous random quantities cannot be written, because $P(X = x_k) = 0$ is for any value x_k.

$F(x) = P(X < x)$ is called the distribution function of the continuous random quantity, and in this case,

1. $F(x)$ non-decreasing function;
2. $\underset{x \to -\infty}{Lim} F(x) = 0$;
3. $\underset{x \to +\infty}{Lim} F(x) = 1$;
4. $F(x)$ the function has breakpoints in cardinal numbers;
5. $F(x)$ the function has the 2-type breakpoints;
6. $F(x)$ function is continuous from the left.

It should be noted that a function which has 6 properties, is not always the distribution function. Therefore, the properties of density function of the continuous random quantity depends on the density function $p(x) = F'(x)$, and the condition $p(x) \geq 0$ is done for voluntary x.

If it is $\displaystyle\int_{-\infty}^{+\infty} p(x)dx = 1$, any function which has abovementioned two properties, can be a density function of any random quantity [5].

Let us observe the evenly distributed density function.

$p(x) = \begin{cases} \dfrac{1}{b-a}, & x \in [a;b] \\ 0, & x \notin [a;b] \end{cases}$ The graph of this density function is given in Figure 1 [5].
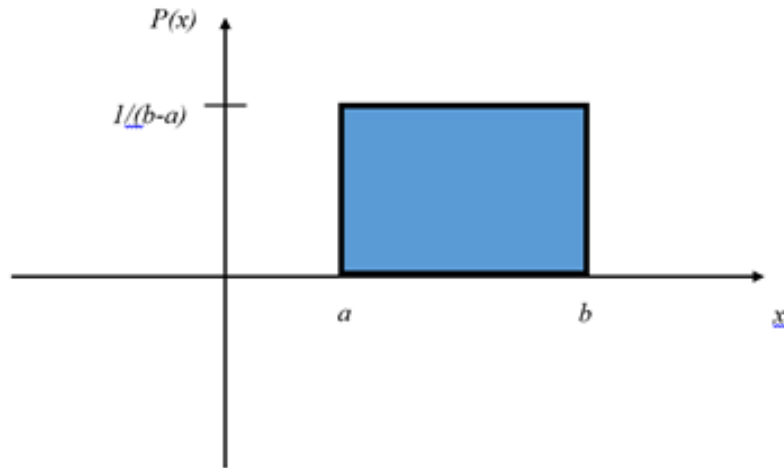
Figure 1.

Let be given us the following random quantity X with the following integral function [1]:

$$F(x) = \begin{cases} 0, & \text{x} \leq \text{-1 бўлганда} \\ \dfrac{3}{4}x + \dfrac{3}{4}, & \text{-1<x} \leq \dfrac{1}{3} \ \ \text{бўлганда} \\ 1, & \text{x>} \dfrac{1}{3} \ \ \text{бўлганда} \end{cases}$$

As a result of the test, we find the probability of receiving of X value which is in the quantity of $\left(0, \frac{1}{3}\right)$ interval. As the probability of receiving value which is in the interval (a, c) of X is equal to the increment of the interval function in this interval

$$P(a < X < b) = F(b) - F(a).$$

We obtain with putting a = 0, b = 1/3 into this formula:

$$P(0 < X < \frac{1}{3}) = F\left(\frac{1}{3}\right) - F(0) = \left[\frac{3}{4}x + \frac{3}{4}\right]_{x=1/3} - \left[\frac{3}{4}x + \frac{3}{4}\right]_{x=0} = \frac{1}{4}.$$

We use the C ++ programming language to calculate the value of the abovementioned integral function. In order to do this, we use a conditional operator. The conditional operator can be used in the following type [2]:

```
if (expression)
{
1- Operator
}
else
    {
     2- Operator
    }
Or
if (expression)
1-Operator
```

When a conditional operator is done, first of all, the expression is calculated. If the value is true, namely, it is non-zero, the 1st operator is executed. If the value is false, namely, it is zero, and else is used, the 2 nd operator is executed. Else part is always set to the nearest if [2].

In C ++, the program codes are as follows [3], [9]:

```
#include <iostream>
using namespace std;
float x,x2,y=1,y1=3,y2=y/y1,y3=4;
float f(float x)
{
  if(x>=-1&&x<=y2)
  {
    return (float(y1/y3)*float(x+1));
  }
  else if(x<-1)
  {
    return 0;
  }
  else if(x>y2)
  {
    return 1;
  }
}
int main()
{
 cout <<" x1= "; cin >>x;
cout <<" x2= "; cin >>x2;
cout <<" f(x1) = "<<f(x)<<endl;
cout <<" f(x2) = "<<f(x2)<<endl;
cout <<" f(x1) - f(x2) = "<<f(x)-f(x2);
}
```

After the compilation process is carried out, the following result will be obtained:

Figure 2. The result obtained in the Console window

It is seen from the abovementioned considerations, the theory of problem-based education is an educational process which explains the psychological and pedagogical ways and means of organizing education in developmental character which reveals the intellectual potential of the student [4], [8]. The student activates practical activity, together with this, his or her interest for subject and the opportunity for better understanding expand, and ensures the ability to work independently with using the modern information technologies in the process of practical training of mathematics, in particular, the effective application of MATLAB, MAPLE, MathCAD software systems and C ++, Java (SE-8) -eclipse computer programs in effective graphic mode.

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