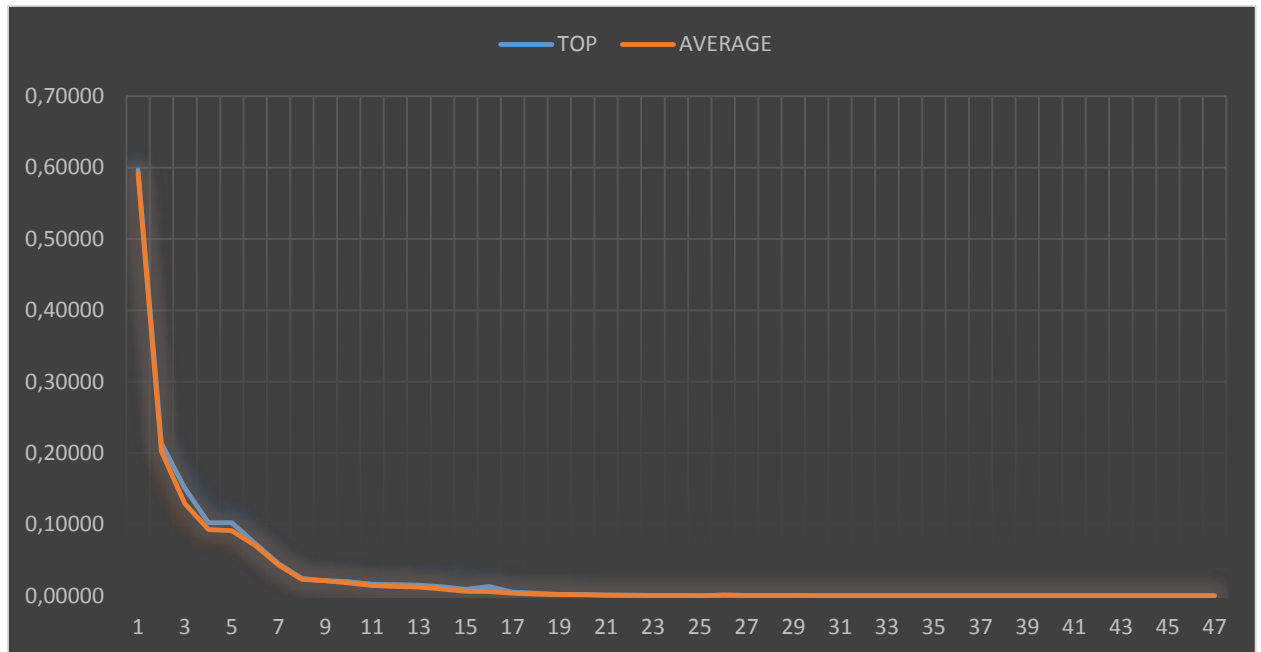


Task-4 Artyom Yudenkov

№	TOP	AVERAGE
1	0,59693	0,59153
2	0,21341	0,20258
3	0,15074	0,12934
4	0,10212	0,09294
5	0,10218	0,09127
6	0,07296	0,07068
7	0,04479	0,04293
8	0,02439	0,02292
9	0,02124	0,02094
10	0,01971	0,01814
11	0,01624	0,01424
12	0,01589	0,01301
13	0,01496	0,01211
14	0,01280	0,00942
15	0,00920	0,00625
16	0,01292	0,00593
17	0,00484	0,00384
18	0,00372	0,00248
19	0,00187	0,00175
20	0,00187	0,00122
21	0,00087	0,00084
22	0,00087	0,00059
23	0,00063	0,00043
24	0,00029	0,00028
25	0,00017	0,00016
26	0,00097	0,00094
27	0,00062	0,00062
28	0,00043	0,00041
29	0,00028	0,00027
30	0,00015	0,00014
31	0,00007	0,00007
32	0,00003	0,00003
33	0,00002	0,00002
34	0,00001	0,00001
35	0,00001	0,00001
36	0,00000	0,00000
37	0,00000	0,00000
38	0,00000	0,00000
39	0,00000	0,00000
40	0,00000	0,00000
41	0,00000	0,00000
42	0,00000	0,00000
43	0,00000	0,00000
44	0,00000	0,00000
45	0,00000	0,00000
46	0,00000	0,00000
47	0,00000	0,00000



```

using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.IO;

namespace Pop
{
    class Chrom
    {
        private static int ch_chrom = 20;
        private static Random rnd = new Random();
        private double HS = ch_chrom;

        private double[] a = new double[ch_chrom];

        public Chrom()
        {
            GenerateRandom();
        }

        public Chrom(Chrom _a, Chrom _b)
        {
            for (int i = 0; i < ch_chrom; i++)
            {
                a[i] = rnd.Next(2) > 0 ? _a.Get_by_num(i) :
                _b.Get_by_num(i);

                HS += Math.Pow(Math.Sin(5 * Math.PI * a[i]), 6);
            }
        }

        public double Get_by_num(int i)
        {

```

```

        return a[i];
    }

    private void GenerateRandom()
    {
        for (int i = 0; i < ch_chrom; i++)
        {
            a[i] = rnd.Next(-5, 6) * rnd.NextDouble();
            HS += Math.Pow(Math.Sin(5 * Math.PI * a[i]), 6);
        }
    }

    public double GetChr()
    {
        return HS;
    }
}

class Pop
{
    private static int Pop_count = 300;
    private static Random rnd = new Random();
    List<Chrom> Pop;

    public Pop()
    {
        Pop = new List<Chrom>();
        for (int i = 0; i < Pop_count; i++)
            Pop.Add(new Chrom());
    }

    public void Sorting()
    {
        Chrom a;
        for (int i = 0; i < Pop_count; i++)
            for (int j = 0; j < Pop_count - 1; j++)
            {
                if (Pop[j].GetChr() > Pop[j + 1].GetChr())
                {
                    a = Pop[j];
                    Pop[j] = Pop[j + 1];
                    Pop[j + 1] = a;
                }
            }
    }

    public void Halving()
    {
        Pop.Del_Dist(Pop_count / 2, Pop_count / 2);
    }

    public void childing()
    {
        int temp = Pop.Count;
        for (int i = 0; i < temp; i++)
        {
            int first = rnd.Next(0, Pop.Count);
            int second = rnd.Next(0, Pop.Count);
            Pop.Add(new Chrom(Pop[first], Pop[second]));
        }
    }
}

```

```

public double GetAverageChrom()
{
    double HS = 0;

    for (int i = 0; i < Pop.Count; i++)
        HS += Pop[i].GetChr();

    HS /= Pop.Count;

    return HS;
}

public double GetTopChrom()
{
    return Pop[0].GetChr();
}

public double GetChr(int i)
{
    return Pop[i].GetChr();
}

public bool Check()
{
    return Pop[0].GetChr() == 0;
}
}

class Program
{
    static void Main(string[] args)
    {
        StreamWriter f = new StreamWriter(@"D:\HS\Average.csv");
        StreamWriter f2 = new StreamWriter(@"D:\HS\Top.csv");
        int generation = 1;
        Pop a = new Pop();
        f.WriteLine(a.GetAverageChrom());
        f2.WriteLine(a.GetTopChrom());
        int count = 0;
        int same = 0;
        double last = 0;
        while (true)
        {
            if (last == a.GetTopChrom())
                same++;
            else
                same = 0;
            last = a.GetTopChrom();
            if (same == 5)
                break;
            generation++;
            a.Sorting();
            a.Halving();
            a.childing();
            Console.WriteLine(a.GetTopChrom());
            f.WriteLine(a.GetAverageChrom());
            f2.WriteLine(a.GetTopChrom());
            if (a.Check())
                break;
            count++;
        }

        f.Close();
        f2.Close();
    }
}

```

}
}
}