Task 4
Student –Golovchik Vlad

Algorithm:

Minimithation of 2D function, $y=\sin^6(5\pi x)$

Code:

```
#include "stdafx.h"
#include <iostream>
#include <fstream>
#include <stdlib.h>
#include <time.h>
#include <vector>
#include <algorithm>
#include <math.h>
using namespace std;


void main()
{
	int Parents[20][10], Select[10][10], i, j, buff, chislo;
	int Cross, Number1, Number2;
	float y[20], x[20], x1;

	srand(time(NULL));
	for (i = 0; i<20; i++)
	{
		for (j = 0; j<10; j++)
		{
			Parents[i][j] = rand() % 2;
		}}


	for (i = 0; i<20; i++)
	{
		x[i] = 0;
		for (j = 0; j<10; j++)
		{
			x[i] += Parents[i][j] * pow(2.0, (9 - j));
		}
		x[i] = x[i] / 1023;
		y[i] = pow(sin(5 * 3.14*x[i]), 6);
	}


	for (i = 0; i<19; i++)
	{
		if (y[i]>y[i + 1])
		{
			x1 = y[i];
			y[i] = y[i + 1];
			y[i + 1] = x1;
			for (j = 0; j<10; j++)
			{
				buff = Parents[i][j];
				Parents[i][j] = Parents[i + 1][j];
				Parents[i + 1][j] = buff;
			}
			i = 0;
		}}

	FILE *PrintFile;
	PrintFile = fopen("TextFile.txt", "w");

	for (i = 0; i<20; i++)
	{
		for (j = 0; j<10; j++)
		{
			cout << Parents[i][j] << "  ";
		}
		cout << endl;
```

```
	}
	cout << endl << endl;
	chislo = 0;

	do
	{

		for (i = 0; i<20; i++)
		{
			fprintf(PrintFile,"", y[i], x[i]);
		}
		fprintf(PrintFile, "\n\n");


		for (i = 0; i<10; i++)
		for (j = 0; j<10; j++)
			Select[i][j] = Parents[i][j];


		for (i = 0; i<20; i++)
		{
			Cross = rand() % 8 + 1;
			Number1 = rand() % 10;
			Number2 = rand() % 10;
			for (j = 0; j<10; j++)
			{
				if (j<Cross)
					Parents[i][j] = Select[Number1][j];
				else
					Parents[i][j] = Select[Number2][j];
			}
		}

		for (i = 0; i<20; i++)
		{
			x[i] = 0;
			for (j = 0; j<10; j++)
			{
				x[i] += Parents[i][j] * pow(2.0, (9 - j));
			}
			x[i] = x[i] / 1023;
			y[i] = pow(sin(5 * 3.14*x[i]), 6);
		}


		for (i = 0; i<19; i++)
		{
			if (y[i]>y[i + 1])
			{
				x1 = y[i];
				y[i] = y[i + 1];
				y[i + 1] = x1;
				for (j = 0; j<10; j++)
				{
					buff = Parents[i][j];
					Parents[i][j] = Parents[i + 1][j];
					Parents[i + 1][j] = buff;
				}
				i = 0;
			}
		}
		chislo++;
	}

	while (chislo != 15);
	fprintf(PrintFile, "\n++++++++++++++++++++++++++++++++\n iteration =
%d\n++++++++++++++++++++++++++++++++\n", chislo);

	for (i = 0; i<20; i++)
	{
		for (j = 0; j<10; j++)
```

```
        {
                cout << Parents[i][j] << "  ";
        }
        fprintf(PrintFile, "", y[i], x[i]);
        cout << endl;
}
fclose(PrintFile);
system("pause");
```

RESULT: