Лабораторная работа «Система ДУ»

Постановка задачи:

Решить систему дифференциальных уравнений вида

$$\begin{cases} \frac{dx}{dy} = -2x + 5z \\ \frac{dy}{dt} = \sin(t-1)\,x - y - 3z \\ \frac{dz}{dt} = -x + 2z \end{cases}$$

С начальными условиями

$x(0) = 2$

$y(0) = 1$

$z(0) = 1$

Мат модель:

$$y_i = h*f(x, y) + y_{i-1}$$

Код:

```
double x = 2, x1, y = 1, y1, z = 1, z1, h = 0.1, i;
for (i = 0; i <= 1; i = i + h)
{
    Console.WriteLine("x[{0:0.0}] = {1:0.000} y[{0:0.0}] = {2:0.000} z[{0:0.0}] =
{3:0.000}", i, x, y, z);
    x1 = x + (-2 * x + 5 * z) * h;
    y1 = y + (Math.Sin(i - 1) * x - y - 3 * z) * h;
    z1 = z + (-x + 2 * z) * h;
    x = x1;
    y = y1;
```

```
    z = z1;
}
```

Результат:

```
x[0.0] = 2.000 y[0.0] = 1.000 z[0.0] = 1.000
x[0.1] = 2.100 y[0.1] = 0.432 z[0.1] = 1.000
x[0.2] = 2.180 y[0.2] = -0.076 z[0.2] = 0.990
x[0.3] = 2.239 y[0.3] = -0.522 z[0.3] = 0.970
x[0.4] = 2.276 y[0.4] = -0.905 z[0.4] = 0.940
x[0.5] = 2.291 y[0.5] = -1.225 z[0.5] = 0.901
x[0.6] = 2.283 y[0.6] = -1.482 z[0.6] = 0.851
x[0.7] = 2.252 y[0.7] = -1.679 z[0.7] = 0.793
x[0.8] = 2.199 y[0.8] = -1.815 z[0.8] = 0.727
x[0.9] = 2.122 y[0.9] = -1.896 z[0.9] = 0.653
x[1.0] = 2.024 y[1.0] = -1.923 z[1.0] = 0.571
```