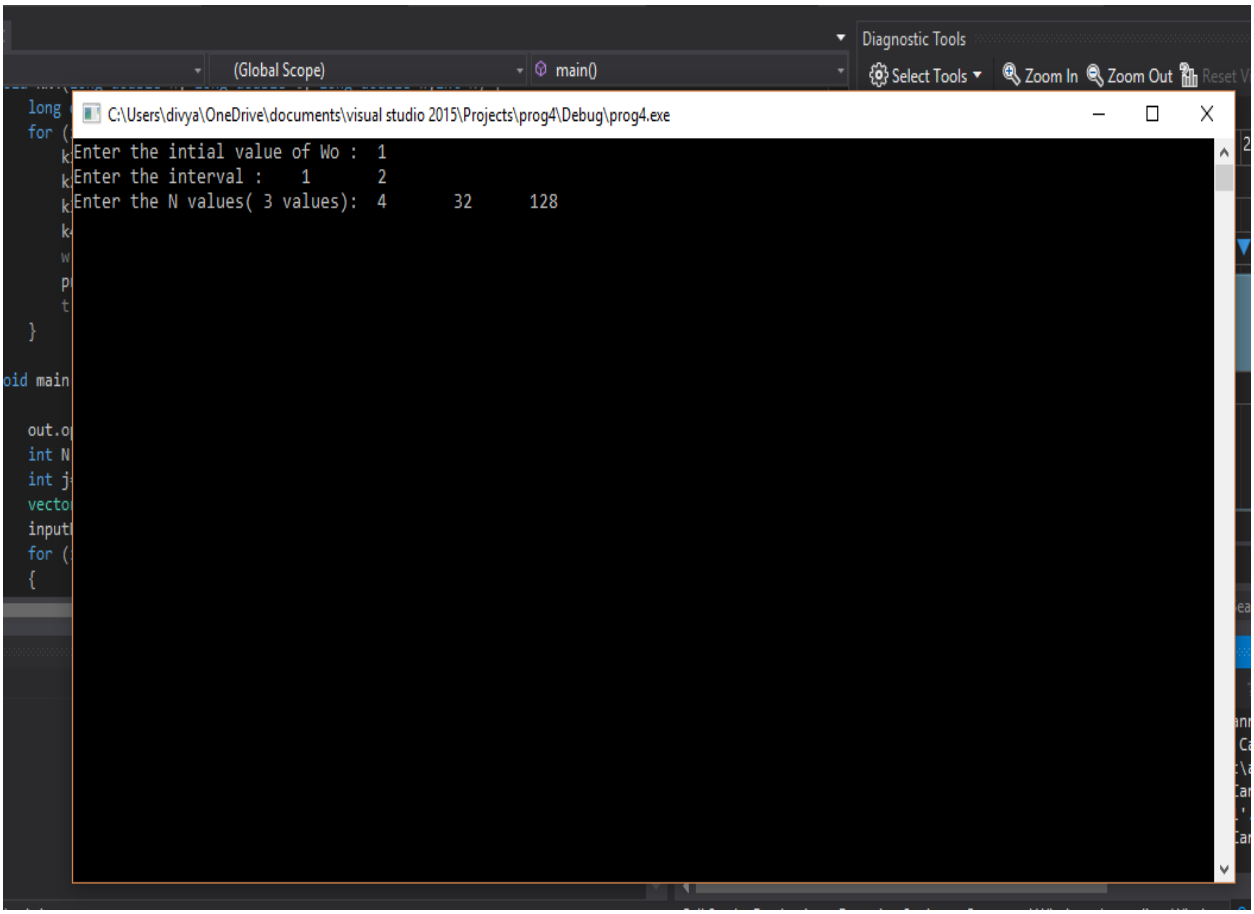
```
//Program-4
//Name:Divyashree H B
//Runge Kutta method of order 4 for f(t,y) = y`= 1/(y^2)-ty

#include<iostream>
#include<vector>
#include <math.h>//exp
#include<iomanip>//precission
#include<fstream>

using namespace std;
ofstream out;

//f(t,y) = y`= 1/(y^2)-ty
long double F(long double t,long double y) {
	return ((1 / (y*y)) - (t*y));
}

//print runge kutta table
void printValues(int i,long double t, long double w) {
	out <<i<<"\t"<< t << "\t\t" << w << endl;
}

vector<long double> getInitialValues() {
	vector < long double> inValue(6);
	cout << "Enter the intial value of Wo :\t";
	cin >> inValue[0];
	cout << "Enter the interval :\t";
	cin >> inValue[1] >> inValue[2];
	cout << "Enter the N values( 3 values):\t";
	cin >> inValue[3] >> inValue[4] >> inValue[5];
	return inValue;
}

void printHeadings(vector<long double> inValue) {
	out << "Divyashree H B" << endl;
	out << "Runge-Kutta method of order 4" << endl;
	out << "3/31/2017" << endl;
	out << endl << "Function : f(t,y) = y`= 1/(y2)-ty " << endl;
	out << "The inital value Wo (alpha) is  " << inValue[0] << endl;
	out << "With the interval ( " << inValue[1] << " , " << inValue[2] << " )" << endl;

}
```

```
void RK4(long double h, long double t, long double w,int N) {
	long double k1, k2, k3, k4;
	for (int i = 1; i <=N; i++) {
		k1 = h * F(t, w);
		k2 = h * F(t + h / 2, w + k1 / 2);
		k3 = h * F(t + h / 2, w + k2 / 2);
		k4 = h * F(t + h, w + k3);
		w = w + (k1 + 2 * k2 + 2 * k3 + k4) / 6.0;
		printValues(i,t+h,w);
		t += h;
	}
}

void main() {

	out.open("output.txt");
	int N[3];
	int j=3;
	vector<long double> inputData;
	inputData = getInitialValues();
	for (int i = 0; i < 3; i++)
	{
		N[i] = inputData[j++];
	}
	printHeadings(inputData);
	for (int i = 0; i < 3; i++)
	{
		long double h = (inputData[2] - inputData[1]) / N[i];
		out << "\nThe number of intervals N is " << N[i] << endl;
		out << endl << "i\tti\t\twi" << endl;
		out << 0 << "\t" << inputData[1] << "\t\t" << inputData[0] << endl;
		RK4(h,inputData[1],inputData[0],N[i]); //call 3 times with 3 different values of N
	}
}
```


Diagnostic Tools
Select Tools
Zoom In
Zoom Out
(Global Scope)
main()
C:\Users\divya\OneDrive\documents\visual studio 2015\Projects\prog4\Debug\prog4.exe
Enter the intial value of Wo : 1
Enter the interval : 1 2
Enter the N values(3 values): 4 32 128