



Analytical Geometry and Linear Algebra II

Joint Assignment 03

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// Erokhin Evgenii DSAI-03
#include <iostream>
#include <vector>
#include <iomanip>
#include <cmath>
#include "cstdio";
#define GNUPLOT_NAME "C:\\gnuplot\\bin\\gnuplot -persist"

using namespace std;

int main(int argc, char * argv[]) {

    FILE* pipe = _popen(GNUPLOT_NAME, "w");
    FILE* pipe0 = _popen(GNUPLOT_NAME, "w");

    int victims;
    cin>>victims;
    int killers;
    cin>>killers;
    double alpha1,beta1,alpha2,beta2;
    cin>>alpha1>>beta1>>alpha2>>beta2;
    int timeLimit;
    cin>>timeLimit;
    int numFor;
    cin>>numFor;
    double v[timeLimit*numFor/timeLimit+1];
    double t[timeLimit*numFor/timeLimit+1];
    double k[timeLimit*numFor/timeLimit+1];
    double timeLimit1 = (double) timeLimit;
    double numFor1 = (double) numFor;
    double v0 = victims - alpha2/beta2;
    double k0 = killers - alpha1/beta1;

    double step = timeLimit1/numFor1;
    int counter = 0;
    double i=0;
    while (i<=timeLimit1){
        t[counter] = i;
        v[counter] = v0*cos(sqrt(alpha1*alpha2)*i)-(k0*sqrt(alpha2)*beta1*sin(sqrt(alpha1*alpha2)*i)/
            (beta2*sqrt(alpha1)));
        k[counter] = (v0*sqrt(alpha1)*beta2*sin(sqrt(alpha1*alpha2)*i)/
            (beta1*sqrt(alpha2))+k0*cos(sqrt(alpha1*alpha2)*i);

        counter++;
        i=i+step;
    }
    cout<<"t:\n";

```

```

for (int i=0;i<counter;i++){
    cout <<fixed << setprecision(2)<<t[i] << " ";
}
cout<<endl;
cout<<"v:\n";
for (int i=0;i<counter;i++){
    cout <<fixed << setprecision(2)<<v[i]+alpha2/beta2<< " ";
} cout<<endl;
cout<<"k:\n";
for (int i=0;i<counter;i++){
    cout <<fixed << setprecision(2)<<k[i]+alpha1/beta1 << " ";
}

fprintf(pipe0, "%s\n","plot '-' title 'killers' with lines,\n");
fprintf(pipe0, "%s\n","-' title 'victims' with lines");
for (int i = 1; i < numFor; ++i) {
    fprintf(pipe0, "%lf %lf\n", step*i,k[i] + alpha1 / beta1);
}
fprintf(pipe0,"e\n");
for (int i = 1; i < numFor; ++i) {
    fprintf(pipe0, "%lf %lf\n", step*i,v[i] + alpha2 / beta2);
}
fprintf(pipe0,"e\n");

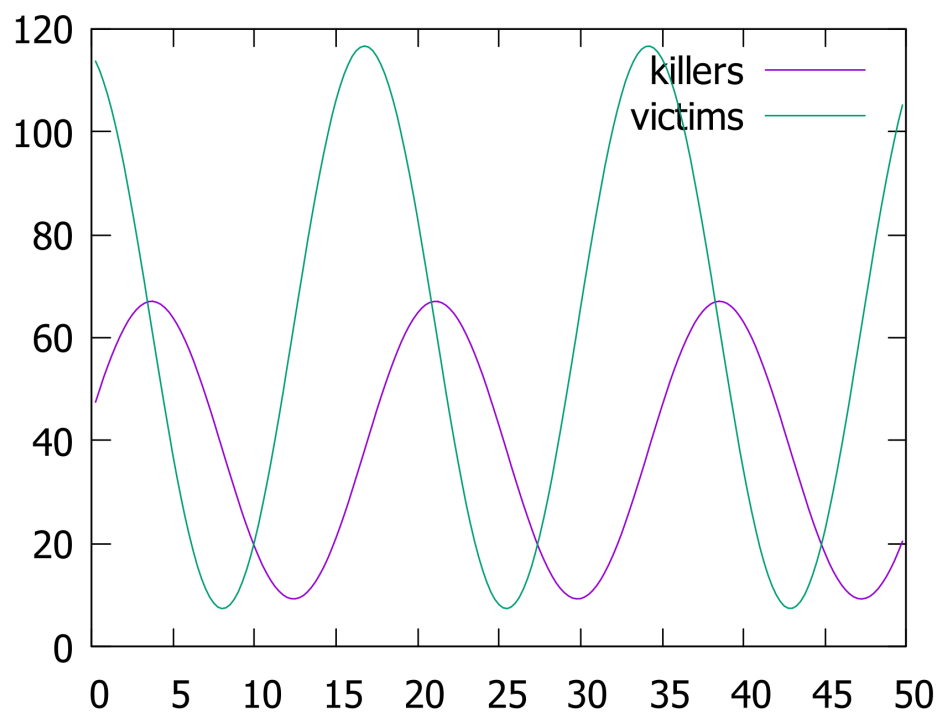
fprintf(pipe, "%s\n", "set ylabel 'killers' tc lt 1");
fprintf(pipe, "%s\n", "set xlabel 'victims' tc lt 1");
fprintf(pipe, "v0=%lf\nk0=%lf\nalpha1=%lf\nalpha2=%lf\nbeta1=%lf\nbeta2=%lf\n", v0, k0,
alpha1,alpha2,beta1,beta2);
fprintf(pipe, "plot '-' using 1:2 title 'v(k)' with lines\n");
for (int i = 1; i < numFor; ++i)
    fprintf(pipe, "%lf %lf\n", k[i]+alpha1/beta1, v[i]+alpha2/beta2);
}

```

v0	k0	α_1	β_1	α_2	β_2	T	M
115	45	0.42	0.011	0.31	0.005	50	200

Make representations for model above

1. $v(t)$ & $k(t)$



2. $v(k)$

