clear

clc

disp ("MT224 - Differential Equations");

disp (" Project BSCS B ");

disp (" Group Members: ");

disp (" Ameera Haider 20I - 0799");

disp (" Naufil Moten 20I - 0642");

disp (" Ahmed Baig 20I - 1884");

disp (" ");

%Start of the Solution

disp ("Start of Progam");

% T(t) is the population of uninfected CD4+ T cells at time ?

% I(t) is the population of infected CD4+ T cells at time ?

% V(t) is the population of virus at time t

% Inital Conditions

% T(0) = To

% I(0) = Io

% V(0) = Vo

% ? is L

% ? is A

% ? is B

% ? is U

% ? is G

% N is N

syms T(t) TT(t) I(t) II(t) V(t) VV(t) Io IIo To TTo Vo VVo L A U N G

%Solving for I(t)

ode1 = (diff(I,t) == (-U.\*I(t)));

cond1 = I(0) == Io;

I(t) = dsolve(ode1, cond1);

%Solving for T(t)

ode2 = (diff(T,t) == (L - A .\* T(t)) );

cond2 = T(0) == To;

T(t) = dsolve(ode2, cond2);

%Solving for V(t)

ode3 = (diff(V,t) == (N.\*U.\*(I(t).\*exp(-t/2)) - (G.\*V(t)) ));

cond3 = V(0) == Vo;

V(t) = dsolve(ode3, cond3);

%Displaying General the Equation

disp ("");

disp ("Equation for T(t)");

display (T(t));

disp ("Equation for I(t)");

display (I(t));

disp ("Equation for V(t)");

display (V(t));

%Assuming the Parameters to be These Values

L = 5;

A = 5;

U = 0.5;

N = 800;

G = 48;

%Solving for I(t)

ode4 = (diff(II,t) == (-U.\*II(t)));

cond4 = II(0) == IIo;

II(t) = dsolve(ode4, cond4);

%Solving for T(t)

ode5 = (diff(TT,t) == (L - A .\* TT(t)) );

cond5 = TT(0) == TTo;

TT(t) = dsolve(ode5, cond5);

%Setting Io = 2 and Solving for V(t)

ode6 = (diff(VV,t) == (N.\*U.\*(2.\*exp(-t/2)) - (G.\*VV(t)) ));

cond6 = VV(0) == VVo;

VV(t) = dsolve(ode6, cond6);

%Plotting the Equations

title('Plot of the Equations');

xlabel('t');

hold on;

fimplicit(TT(t));

fimplicit(II(t));

fimplicit(VV(t));

hold off;

%End of the Solution

disp ("End of Progam");