

```
%Most of the sample data was obtained from the paper itself. The time span  
%and the variables used in the function were all chosen based on what the  
%author used
```

```
time_span = [0,100];  
initial_conditions =[0.5, 0.6, 0.5, 0.2];  
[time,y_values] = ode45(@prey_predator,time_span,initial_conditions);
```

```
%After using the ode45, the solution to all the differential equations is  
%kept in the matrix y_values
```

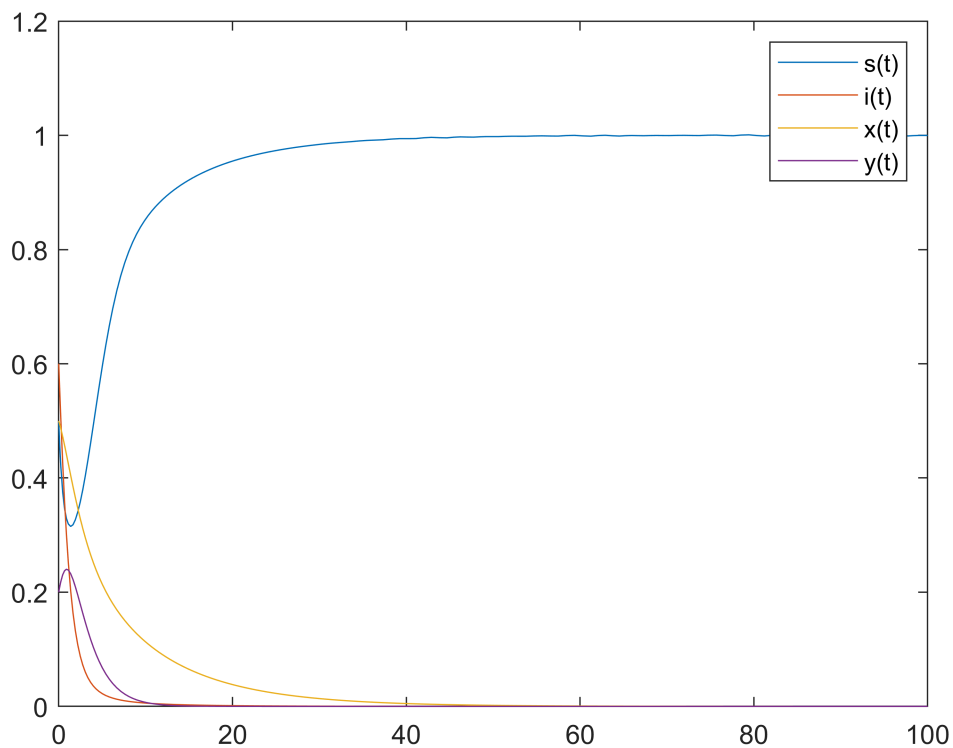
```
s_values = y_values(:,1);  
i_values = y_values(:,2);  
x_values = y_values(:,3);  
y_values = y_values(:,4);
```

```
plot(time,s_values)  
hold on
```

```
plot(time,i_values)  
hold on
```

```
plot(time,x_values)  
hold on
```

```
plot(time,y_values)  
hold on  
legend('s(t)', 'i(t)', 'x(t)', 'y(t)')
```



```
% <<image.jpg>>
```

```
function yprime = prey_predator(t,Y)
%declaring the variables in the equations
a =0.4;b=1;c=0.1;d=0.5;e=0.2;f = 0.2;g=0.15;m=1.5;n=1.4;...
    alpha = 0.5;sigma = 0.2;

%extracting the variables s,i,x,and y
s = Y(1);
i = Y(2);
x = Y(3);
y = Y(4);

yprime = zeros(size(Y));
%we are going to re-assign yprime with the values corresponding to s' i'
%x' and y'

yprime(1)=s.*(1 -s -i) -a*s.*i -b*s.*x;
yprime(2)=a*s.*i -d*i - f*x.*i -m*i.*y;
yprime(3)= c*s.*x + g*i.*x - e*x.*y - sigma*x;
yprime(4)=e*x.*y - alpha*y + n*i.*y;

end
```